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The Personnel Journal

DEVOTED TO INDUSTRIAL PSYCHOLOGY
The Science of Work, the Human Factor in Management and the Satisfactory Adjustment of Individuals to Their Occupations

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THE PERSONNEL JOURNAL publishes original investigations in the applied sciences that contribute to knowledge and effective direction of people at work.

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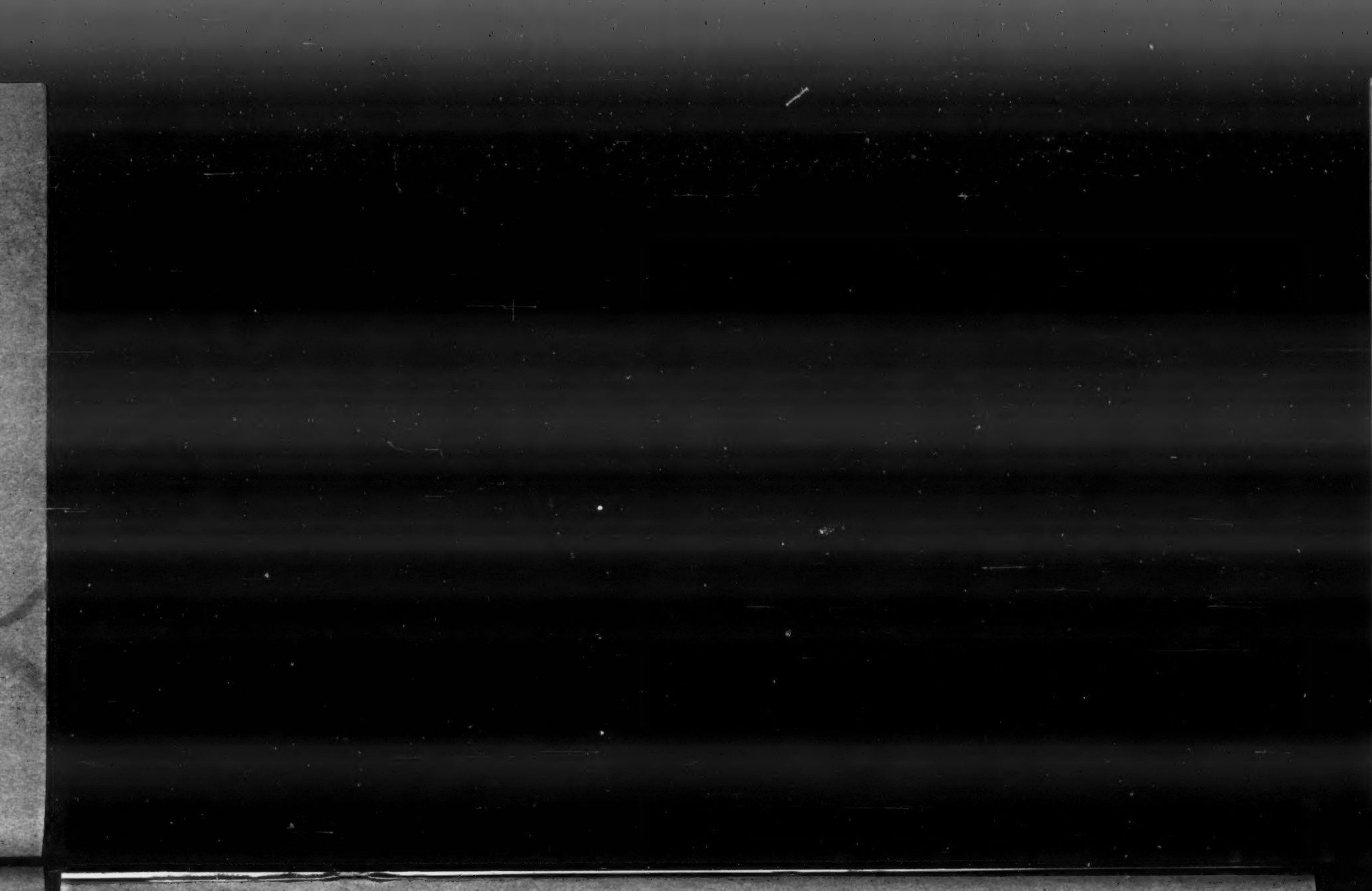

Aptitude Tests in Selecting Medical Students

By F. A. Moss, *George Washington University*

The service to professional education rendered by cooperative research in the measurement of aptitudes is admirably illustrated in this article by Dr. Moss. It describes an extensive investigation which has led to definite improvement in the means of selecting the young men who will become the physicians of the future.

In order to meet the problems of selecting medical students, for the last two years the Association of American Medical Colleges has been experimenting with aptitude tests for predicting success in medical schools. This work has been under the supervision of a special committee of the Association.

Aptitude test results have been correlated with two years' work in medical schools for 963 students, and with first year medical school grades for 4,811 cases. High correlations were obtained with both groups. Study was also made of the relative value of the aptitude test as compared with other criteria for predicting success in the medical school. The criteria studied, in the order of their value as shown by the study, were: aptitude test; grades in premedical subjects; interview ratings given by medical school admissions committees; and semester hours of premedical credit least valid. From the study, the best criterion seemed to be a combination of premedical grades and test results.

After two years' experiment, the results were definitely encouraging, and at the last meeting of the Association of American Medical Colleges, the aptitude test was adopted as a normal requirement for admission to American medical colleges. In carrying out this requirement the test has been administered this year to approximately ten thousand premedical students applying for admission to the medical schools.

IN THE school year 1929–30 there were 31,481 applications to the medical schools from 13,569 applicants. Of this number, only 7,019 were accepted, which indicates that those in charge of admission must refuse approximately three out of four applications. The problem, then, is for the admission officers of each school to select the best one out of four applicants. Or, if we look at it from the standpoint of all schools, the problem is to secure the most promising seven thousand from the total number of applicants.

The difficulty of selecting medical

students is emphasized by a study of the mortality in the last five graduating classes in medical schools. In these classes more than one-fifth of all those who began work in the freshman year were unable to complete the four year course.

With this situation in mind a study of the freshman medical classes in twenty-two medical schools was carried out during the school year 1928–29. An attempt was made to devise a test which would indicate ability to pursue successfully a medical course, and which might be used as one of the determining factors in selecting students for admission to the medical school. A report of the study in these twenty-two medical schools was presented before the Association of American Medical Colleges. Following the report, the Association appointed a Committee[1] to direct further experimental study of these tests as a criterion in selecting medical students. This year's investigation included: first, a study of the relation between test scores and work over two years in the medical school, following through their sophomore year those students on whom we reported last year as freshmen. Second, it included a further study of prediction of scholastic success in the freshman medical work in fifty additional schools that gave the test this year. And, third, it included a comparative study of certain other criteria for selecting medical students.

In every instance, the tests were given by someone in the local medical school and forwarded to the committee for scoring and tabulation. Results were then sent to the dean of the school coöperating so that he might use them in any way desired in connection with advising or eliminating students. At the end of the year, transcripts of the medical school grades of the students were forwarded to us for use in studying the efficiency of the test in predicting grades.

COLLEGES COÖPERATING

Altogether, 67 medical schools in the United States, one in the Philippines, and two in Canada have cooperated in the study. A total of 7,468 tests have been included in this study; 1,035 given to medical students and 517 to premedical students in the school year 1928–1929; and 4,811 to medical students and 1,105 to premedical students in the school year of 1929–1930.

HOW THE TEST PREDICTS THE FIRST TWO YEARS OF MEDICAL WORK

How well the test predicted scholastic success over two years of medical school work is shown in figure 1.

In figure 1 the students were divided into ten equal groups on the basis of their scores on the Scholastic Aptitude Tests. Each bar shows the medical school grades over two years for one-tenth of the group. For example, in the highest tenth of test scores, there

[1] The Committee: Torald Sollmann, Western Reserve University Medical School, chairman; H. G. Weiskotten, Syracuse University Medical School; Edward Koch, University of Buffalo Medical School; Beverly Douglas, Vanderbilt Medical School; and F. A. Moss, Secretary and Director of Study.

are no failures[2] in either the freshman or the sophomore year; and the average grade of this group of students for the two years is 85.9. Contrast this with the lowest tenth. We find 42 per cent who have failed by the end of the second year. The average of all the grades for this lowest group is barely passing, being 75.1. The other lower groups also show large percentages of failures and low average grades for the group. If mortality in the last two years of medical school is as high as in the first two years, no students in these lower groups will graduate from medical school.

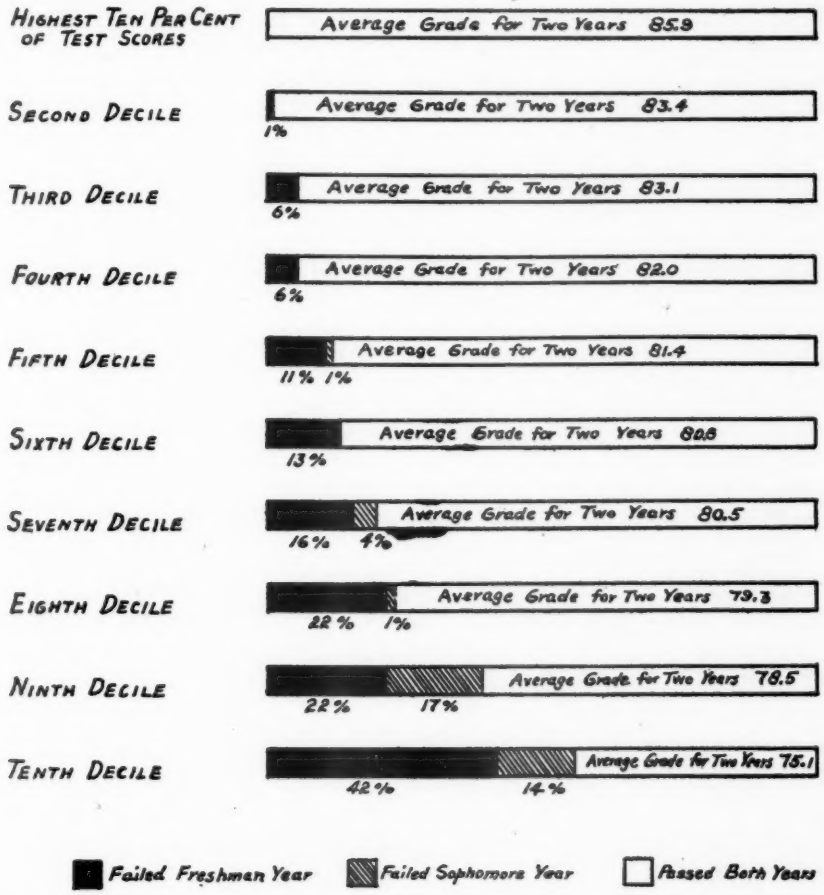

Fig. 1. Success in the First Two Years of Medical School According to Tenths of Test Scores

failing the freshman year, and an additional 14 per cent failing the sophomore year, making a total of 56 per

[2] In this study, all medical school grades have been reduced to a comparable basis, using 75 as the passing point.

Dividing the group into quarters on the basis of Scholastic Aptitude Test scores, it was found that in the highest quarter of test scores, 8 per cent made averages of 90 or over in their freshman year, and 6 per cent made this average in their sophomore year. Only 1 per cent failed, the failures being made in the freshman year. In the third or next to highest quarter, 3 per cent made 90 or over in their freshman year, and 2 per cent in their sophomore year. In this quarter only 8 per cent had failed by the end of the sophomore year. In the second quarter there is only one record with an average above 90, this being in the freshman year. Eighteen per cent of this quarter had failed by the end of the second year's work. In the lowest quarter, 43 per cent have failed by the end of the sophomore year. There is only one record with a 90 average, that being in the sophomore year. Thus, in the whole group of about 900, only one student in the lower half of test scores has a freshman average as high as 90 and only one with a sophomore average as high as 90; while in this lower half there is a very large percentage of failures and low grades.

Based upon the distribution of two years of medical school grades in the various test score groups, we may state:

If a student has a score as high as the upper tenth of those tested:

The chances are 100 per cent that he will pass at the end of the sophomore year;

And the chances are 68 out of 100 that he will average 85 or over at the end of the sophomore year.

On the other hand, if he is as low as the lowest tenth of those tested:

The chances are 56 out of 100 that he will fail by the end of the sophomore year;

And the chances are 96 out of 100 that he will average below 85 at the end of the sophomore year;

Or 76 out of 100 that he will average below 80.

If he has a score as high as the upper quarter:

The chances are 99 out of 100 that he will pass at the end of the sophomore year;

And the chances are 49 out of 100 that he will average 85 or over at the end of the sophomore year.

On the other hand, if he has a score as low as the lower quarter:

The chances are 43 out of 100 that he will fail by the end of the sophomore year;

And the chances are 93 out of 100 that he will average below 85 at the end of the sophomore year,

Or 62 out of 100 that he will average below 80.

High correlation coefficients were obtained between the test scores of the students and the final grades given by instructors in the medical schools, both in the freshman year and in the sophomore year. The correlation for the group as a whole for first year grades was 0.59 and for second year grades was 0.54. This difference does not necessarily represent a lower predictive value for the test in the second year, but probably a lowering effect on the correlation of having eliminated a large number of the poorer students before the second year. We had correlations in separate schools of this

group as high as 0.72 for the freshman grades and as high as 0.73 for the sophomore grades.

THE PREDICTION OF FRESHMAN GRADES BY THE APTITUDE TEST

In studying test prediction of scholastic success in the freshman year of medical school we examined the grades made by three groups of freshman students: a group of about 900 who took the test in the spring of 1929 and were freshmen during the year 1928–9; a group of about 1,000 who took the test in the fall of 1929; and a group of about 4,000 who took the test in the spring of 1930, the two last groups being freshmen during the past scholastic year. These groups have been combined and the results are summarized in figure 2.

As in figure 1 each bar represents one-tenth of the group on the test scores. For each tenth the distribution of medical grades is shown. For example, in the highest tenth of test scores, 15 per cent make 90 or above, 77 per cent between 80 and 89, and 8 per cent between 75 and 79, with no failures. Contrast this with the lower

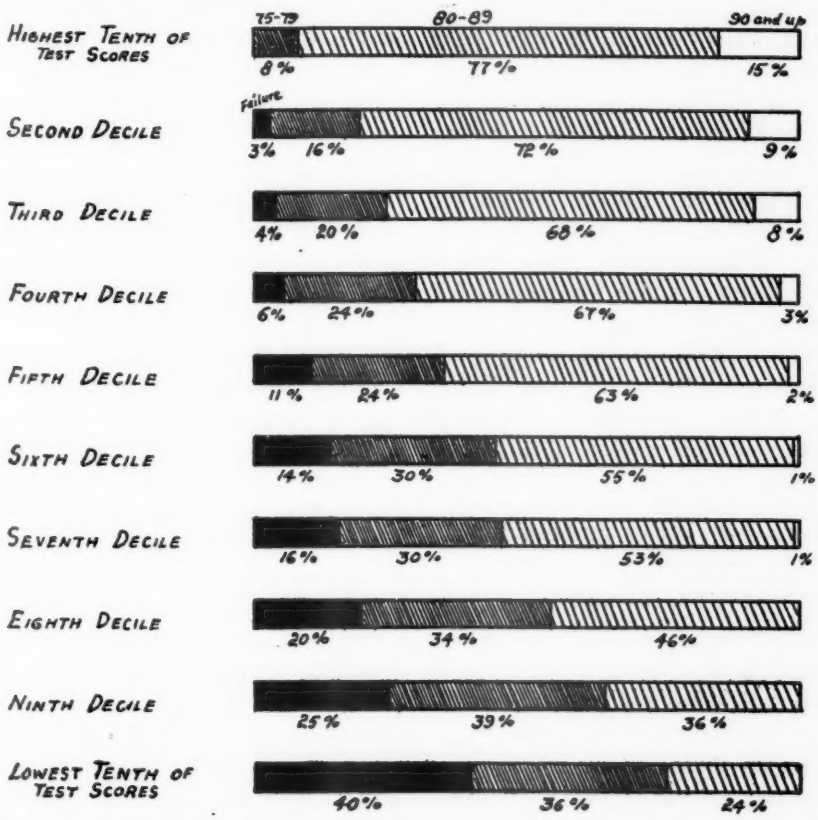

FIG. 2. DISTRIBUTION OF FRESHMAN MEDICAL GRADES ACCORDING TO TENTHS OF TEST SCORES

groups of tests scores in which there are none above 90, and the percentage above 80 is relatively small, but the number of failures becomes increasingly larger as we go down the aptitude scale.

On the whole, the results as shown in the three groups indicate a high predictive value for the test. With few exceptions those in the upper part of the test distribution make very creditable grades, while those in the lower part are very likely to be failure students. The results are further substantiated by high correlation coefficients between test scores and grades in most of the schools added to our study this year. The correlation for this year's freshman group as a whole was 0.55. In one school giving tests this spring we found the exceedingly high correlation coefficient between test scores and freshman work of the students of 0.83.

COMPARATIVE STUDY OF OTHER CRITERIA FOR SELECTING MEDICAL STUDENTS

We have been interested in studying the predictive value of certain other criteria which are now generally used in selecting medical students, and comparing with these the predictive value of the test scores. It is, of course, obvious that we should not recommend the replacement of valuable criteria already in use by Aptitude Tests alone; but within the limits of practicability of application it would seem desirable to have all the possible criteria of ability for consideration before admitting students. It is to be expected that an ideal criterion of admission would be a combined rating which would give proper weight to those factors proving most valuable.

The real value of the Aptitude Test is seen in comparison with other methods now commonly used for admitting students to medical schools. Such criteria include: (1) quality of premedical work, or grades on premedical subjects; (2) personal interviews and personal ratings, and (3) number of semester hours' credit offered in premedical work.

(1) *Grades on premedical subjects.* This is probably the most generally used criterion for admission. In order to study the comparative value of premedical subject grades and the Aptitude Test scores, we requested from a selected number of schools who had coöperated, the premedical records or ratings of their freshman classes. Those selected were representative schools from the various sections of the country. Included in the group that forwarded premedical records were: Stanford and California from the Pacific Coast, North Dakota and Western Reserve from the North Central States, Vermont from New England, George Washington and Howard from the Middle Atlantic, and Alabama and North Carolina from the South. In order to make the records for all the schools comparable we have used the grades in required premedical subjects, including general chemistry, organic chemistry, physics, zoölogy, and English, average premedical grades being calculated on the basis of these subjects.

Figure 3 shows the distribution of freshman medical grades for different premedical averages. In this chart the freshman students are divided into

ten equal groups on the basis of their premedical averages. The first bar represents the highest tenth of students in their premedical work, the second bar the next to the highest tenth, and so on to the last bar which represents the lowest tenth in premedical grades. definitely positive relation between premedical grades and success in freshman medical work, there being a definite tendency for those with high premedical records to do better medical school work than those with low premedical records. However, this figure

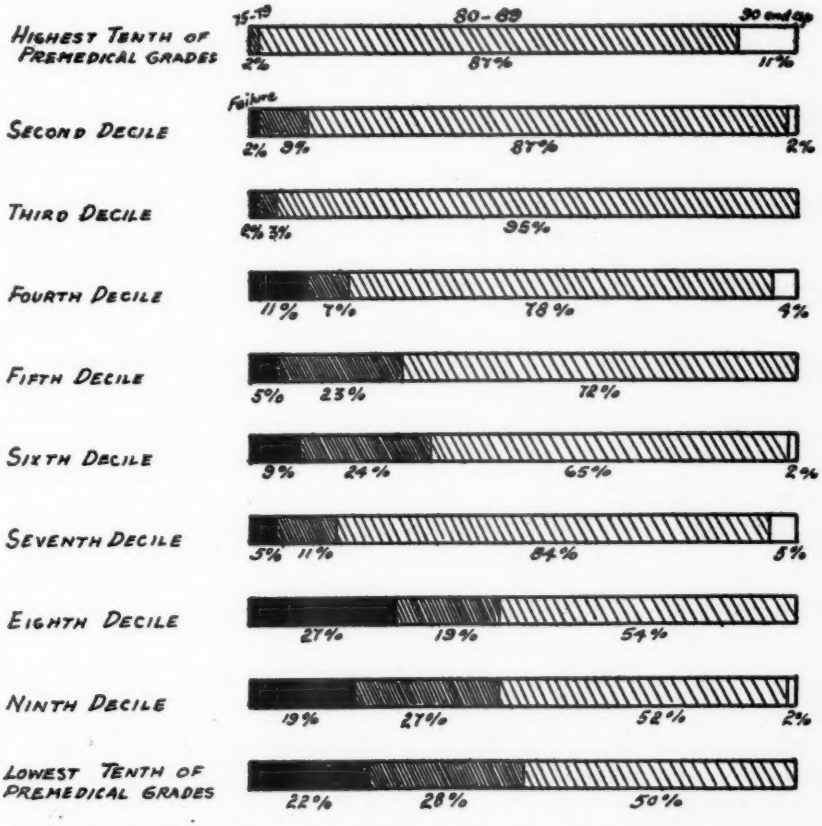

Fig. 3. Distribution of Freshman Medical Grades for Different Premedical Averages

Noticing those of the highest tenth of premedical grades, we see that 11 per cent of them made an average freshman medical grade between 90 and 100, and 2 per cent made between 75 and 80, none failing the first year. It can be seen from this chart that there is a should be contrasted with figure 2 where the students are divided into tenths on the basis of test scores. The highest tenth of premedical grades shows 11 per cent of 90 or above medical grades in the first year; the highest tenth of test scores shows 15 per cent

of 90's. The last three tenths of premedical grades show practically no difference in distribution of freshman medical grades; the last three tenths of test scores show a constant gradation in the medical work of the students. A student who falls in the lowest tenth of premedical grades has a 50–50 chance of making a freshman average of 80 or above; if he falls in the lowest tenth of test scores he has only about one chance in four of making a freshman average of 80 or above.

Since our medical schools are more particularly interested in predicting failures in the medical school, we have also approached the comparative study of premedical grades and test scores in a little different way.

In the nine schools for which we had premedical college records of the students, there were 55 among those taking the test who received freshman medical averages below passing (below 75). These students had already been selected largely on a basis of premedical grades. However, for the purpose of comparing the two criteria for selection, let us suppose that entrance standards had been set at "C" or "80" premedical average, and at the lower quartile point on the test, and all had been refused admission who had premedical averages below 80 or who had scores in the lower quarter of the distribution. While these are rather arbitrarily assumed deadlines, they are probably commensurate with any changes that might be made in these requirements. By such a premedical criterion 43 per cent of the failures would have been eliminated. On the other hand, by the test score criterion indicated, 69 per cent would have been eliminated. These percentages are shown by two of the bars as indicated on figure 7.

It is of further importance to notice the number of good students who would also be eliminated; for a criterion could not be called efficient, even if it eliminated failures, if at the same time it also eliminated a number of good students. In the nine schools there were 125 freshman medical averages of 85 or above. The indicated premedical criterion would have eliminated eight making averages as high as 85, the Aptitude Test criterion only one.

Considering both criteria together, we find that 73 per cent of the failures occurring in this group could have been eliminated by a combination criterion. (See fig. 7.) Thus we might say, with selection based largely on premedical grades and with the present standards, there are 55 failures in these nine schools. Forty-three per cent of these could have been eliminated with a premedical criterion raised to "80" average, but eight of the students with averages of 85 or above would also have been eliminated. Sixty-nine per cent of them could have been eliminated with a test criterion (refusing admittance to the lowest quarter of scores) with only one 85 student eliminated.

It would seem from these comparisons that the test scores would predict somewhat better than the premedical grades the degree of success in medical school, but we should desire to give consideration to the value of each in a composite criterion of selection.

For each of the nine schools a detailed study has been made of the agreement of the premedical grades, test scores, and a combination of the

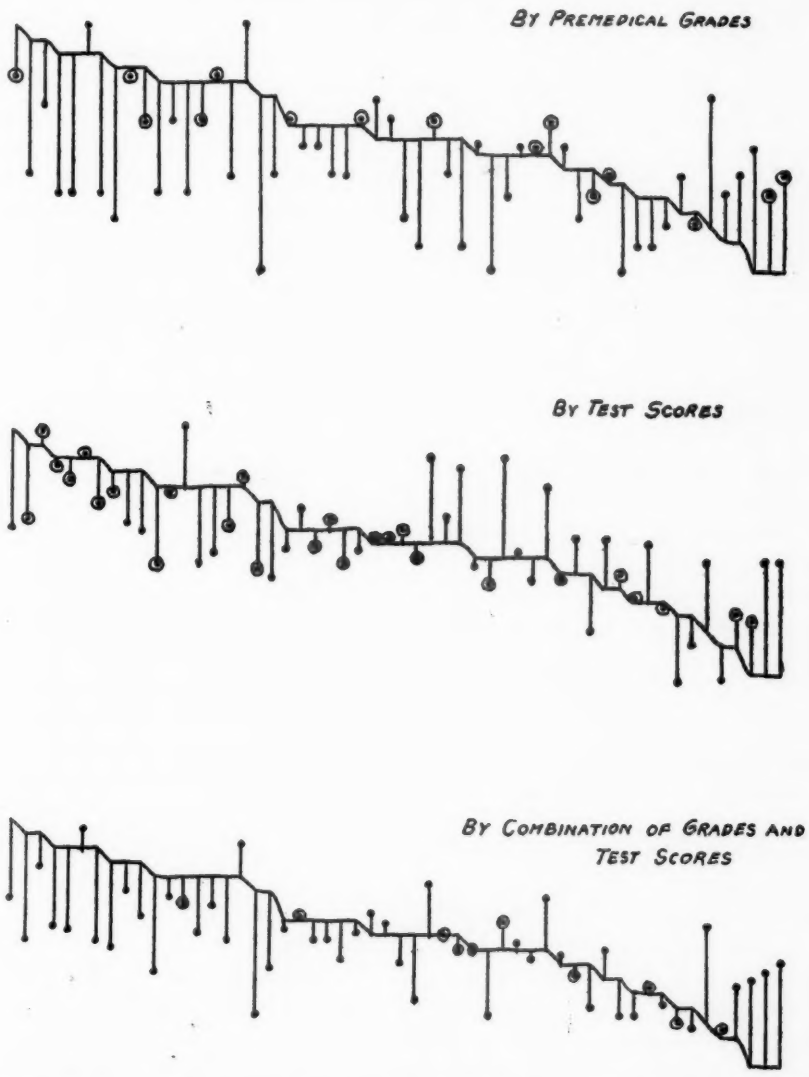

Fig. 4. Prediction of Freshman Medical Grades in School A by Various Criteria

Twenty-seven predicted best by test scores, 15 predicted best by premedical grades, 10 predicted best by combination, 5 predicted same by both.

two with freshman medical grades. Two of these detailed studies are shown graphically in figures 4 and 5.

In each instance the medical school grades for the freshman year have been plotted along the irregular descending line across the chart from left to right. The upper plot on each chart shows

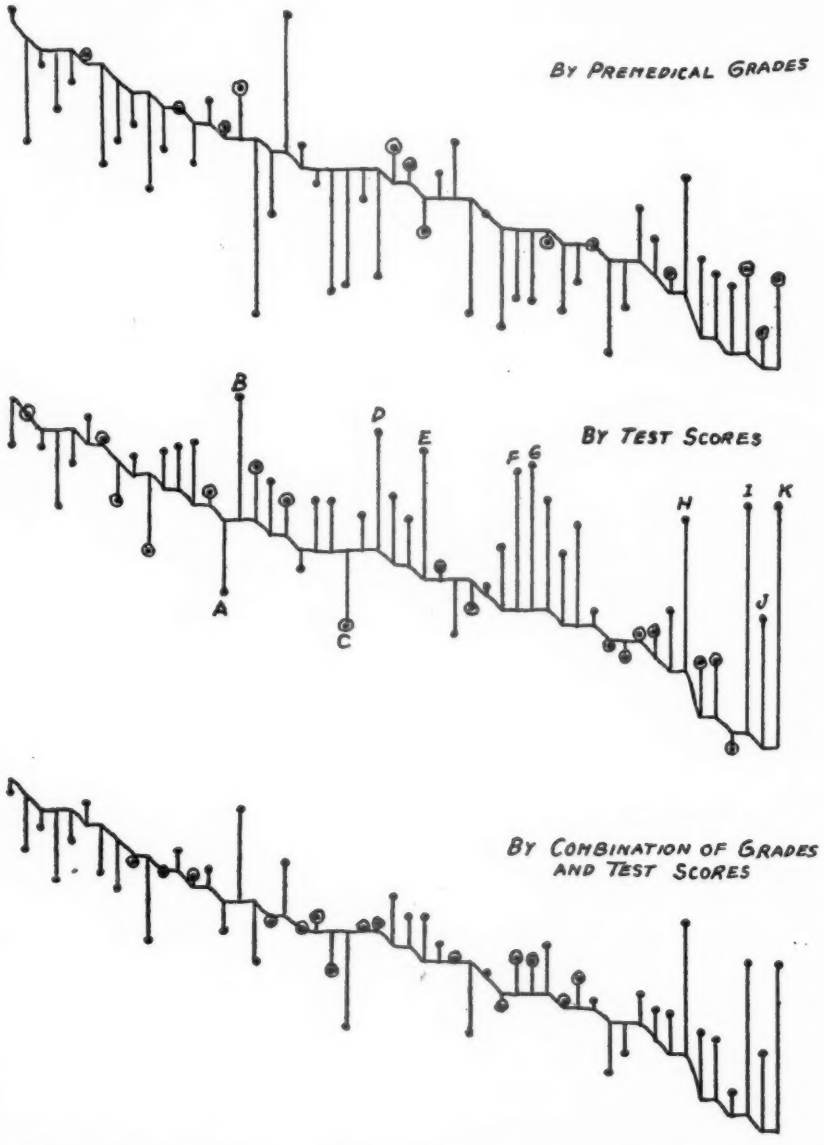

FIG. 5. PREDICTION OF FRESHMAN MEDICAL GRADES IN SCHOOL B BY VARIOUS CRITERIA

Seventeen predicted best by test scores, 13 predicted best by premedical grades, 15 predicted best by combination, 6 same by both.

the premedical grades plotted against freshman medical work. Where the dot occurs near the line of medical grades it means that the premedical grades predicted well the freshman medical work. The distance of the

dot above or below the line shows the extent to which the premedical grade failed to predict the freshman work in the medical school.

The second plot shows on a comparable scale the extent to which the Aptitude Test scores predicted the freshman medical grades. The third plot shows the prediction by using a combination of premedical grades and test scores, giving each an equal weight. The students occupy the same relative order in the three plots, so that each student's record for the test and the combination is presented directly under his representation on the top plot. The circles around the dots indicate "best predictions." For example, if a student's work in the freshman year is predicted best by the test score, this dot for him in the test plot is encircled.

In School A, figure 4, we find 27 whose freshman medical work is predicted best by the test score, 15 predicted best by the premedical grade, and 10 best by the combination, and 5 predicted the same by the two criteria. Or we may say that by use of the test or a combination of the test and the premedical grades, the prediction of the freshman medical work can be improved in 37 cases or in 68 per cent of the group. It is interesting to note that prediction by the premedical grades is poorest for those making distinctly high records in the medical school and those making distinctly low records. In the majority of the cases the premedical grades predict too low for the high medical school records and too high for the failure records in the medical school.

To examine in more detail the records for School B, figure 5, we may note the following:

Thirteen are predicted better by the premedical grades than by either the Aptitude Test or the combination. As will be seen from the chart there are a number of marked discrepancies in the top plot. In most instances these are students with low or mediocre premedical records who have done good work in the medical school. And if these are checked in the second plot of Aptitude Test records it will be seen that their ability rating on the test usually places them much closer to their actual achievement in the medical school.

Noticing now more particularly the second plot of this chart, we find 17 predicted better by the Aptitude Test than by either the premedical grades or the combination. By use of the test either alone or in combination with premedical grades, prediction could have been improved in 63 per cent of the cases. In this plot also there are several discrepant cases. We have marked cases "A" to "K" for special consideration.

In the case of "A," who did better work in the medical school than his Aptitude score would indicate (and who also did better premedical work), a note from the admissions officer of his school says "he is a student who works with great enthusiasm when interested." Here we probably have a case of compensation for certain lack of ability by other traits conducive to success. The test may indicate his ability but, of course, cannot indicate interest and enthusiasm out of proportion to that of other students.

Student "C," according to admission officers of his medical school, is a Japanese and one who "has shown marked ability in investigation in bac-

teriology before entering the medical school. He is rather slow but thorough." Here we have a student in medical school with performance above both his test record and his premedical record. Foreign parentage and a language difficulty probably lowered his test record and previous experience and interest raised his medical school work. Student "D," who made a first year record considerably below her ability, was reported to us as follows: "D" took the medical work in biochemistry during summer quarter preceding entering the medical school, at the end of a hard year, and made grades that materially affected her first year record.

Student "H" was reported as having "good ability but lazy and conceited." His ability is borne out by his relative position on the test, and his laziness by his low record in his medical work.

Case "I," another student whose ability is, according to the test, much above his performance, is reported as a "reformed druggist, one with a background which for some reason rarely seems to be conducive to good work in the medical school."

About case "K" the admission officer states that he "is a very kind-hearted, easy-going fellow of especially attractive personality, who is easily induced to do something else than his work. For instance, he put in hours and hours reading to a blind fellow student in another department, reading his lessons to him rather than doing his own work."

Students B, E, F, G, and J, it will be noticed, show abilities on the test above their performance in the first year medicine. No explanation has been indicated for these. Taking for granted that they could not have obtained a test record higher than their actual ability, we must assume that they are working at a very low efficiency, at a level much below their capabilities.

These individual cases are cited to indicate that Aptitude Test results cannot measure extraneous factors of interest, study habits, outside worries, etc. Inasmuch as these factors cannot be measured, no criteria will give a perfect prediction of scholastic success in the medical school. However, a knowledge of the ability as shown by test results is often of considerable value in dealing with such problem cases.

Similar results were obtained upon individual analysis of the records of the other schools in this group.

(2) *Interview ratings on personality traits.* Interviews should be given consideration among the criteria for selecting students because of the possibility of gaining through their use knowledge of traits of personality or character which might reduce the chances of success. While it is highly desirable to consider such traits, interviews are often so unreliable as to make us hesitate to give much weight to ratings based upon such interviews. There seem to be three chief reasons for the unreliability of the interview. First, those conducting the interview tend to generalize on too few experiences. If the interviewer has had an unfortunate experience with one red-headed person, he tends to regard all red-headed people with suspicion. A second cause for the unreliability of the interview is the widespread assumption that habits are

general rather than specific. It is assumed that neatness in one situation will carry over into other situations or it may be assumed that a person who talks rapidly will also work rapidly. And the third and probably most important reason for the unreliability of the interview is the total lack of standards for judging answers to the interviewer's questions. When we estimate the patient's hemoglobin by the hemoglobinometer our results are fairly reliable because we make direct comparison with a standard. But unfortunately no such standards are available for estimating one's showing in an interview.

In two of the nine schools already discussed, ratings given on personal interviews with the students were available. These ratings were made by committees of medical school officers and instructors before admission of the students. In one of the schools

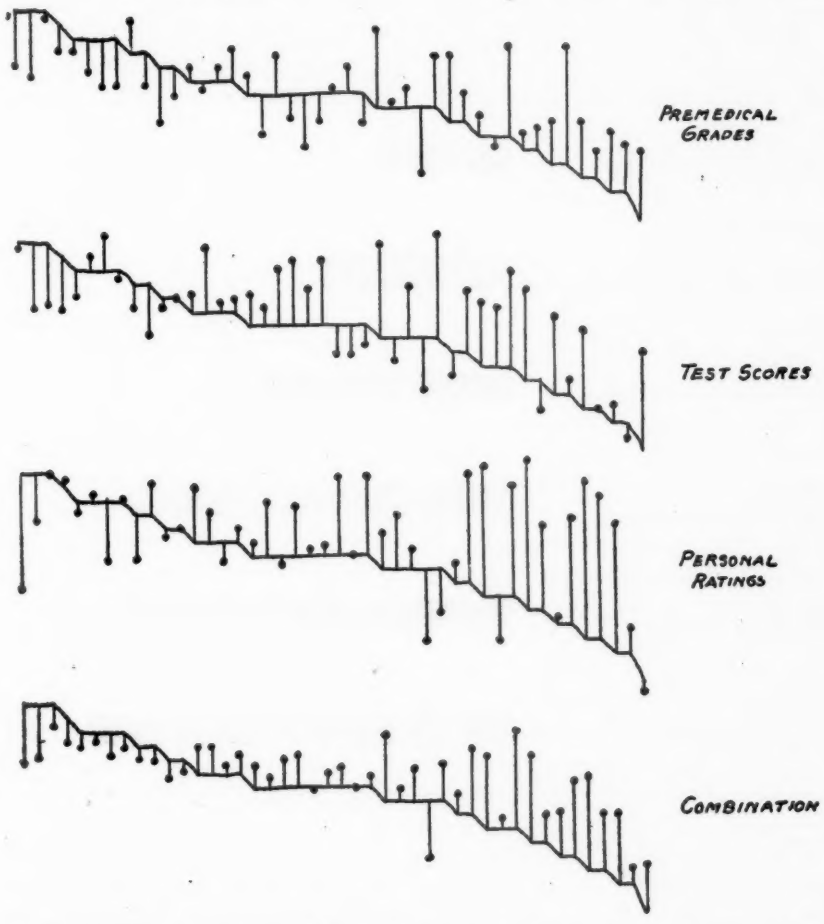

FIG. 6. PREDICTION OF FRESHMAN MEDICAL GRADES IN SCHOOL C BY VARIOUS CRITERIA

ratings were given on a 0 to 4 scale, and in the other on a 0 to 3 scale.

The comparative efficiency of premedical grades, test scores, and ratings for one of these schools is shown in figure 6. An examination of the rating plots for this school will show that there are a number of very wide discrepancies. In this school, one of the men with a freshman medical school average of 89, the highest in the group, was given one of the lowest interview ratings. Of the twelve students in this school making a freshman average below 80, eight of them were given high interview ratings.

In order to compare the prediction of failures by interview ratings with the prediction of failures by the other criteria, we drew the "deadline" at the lowest quartile point of the total group of ratings. There are nine failures in the two schools. If we refused admission to those in the lowest quarter of ratings, we would eliminate three of these nine failures, at the same time eliminating 6 out of 26 who make 85 or above. By a combination of the three criteria (premedical grades, tests, and ratings) six of the failures would have been eliminated.

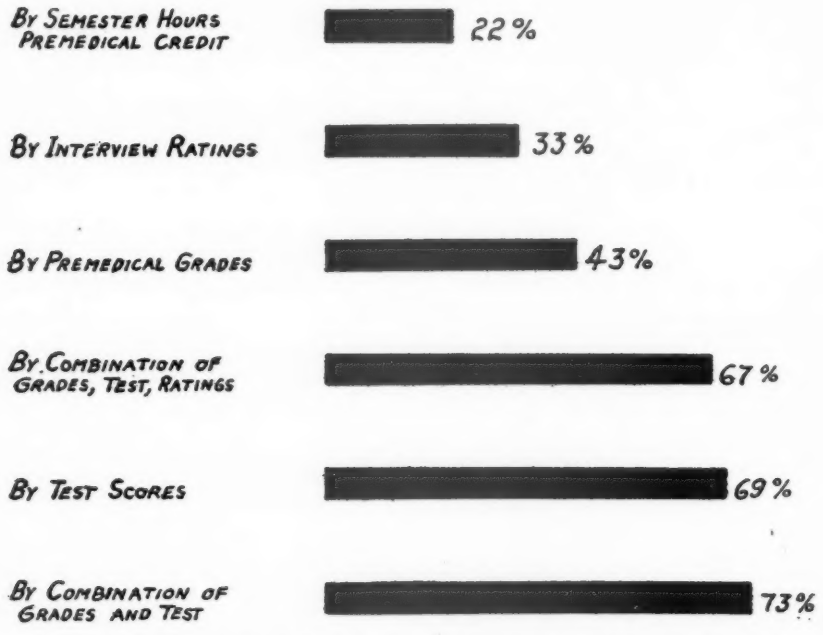

Fig. 7. Prediction of Medical School Failures by Various Criteria

While no very definite conclusions can be drawn from a study of only two schools, the results in these instances indicate very little predictive value for interview ratings. In fact, slightly better prediction of failures seems to be obtained by a use of a combination of only premedical grades and test scores, or by use of test scores alone, than by a criterion giving weight to interview ratings. It is probable that we should

want to retain interview methods for special cases, but it may be that better prediction can be secured without giving such ratings a definite weight in determining admission. More study along this line is necessary before conclusions can be drawn. It is also probable that the technique of interviews can be improved so that very much better results will be obtained. It certainly deserves further study.

(3) *Number of semester hours premedical credit.* This factor has been given attention because of the tendency in medical schools at the present time to demand three or four instead of two years premedical work before admitting students to the medical school. In those schools that do admit students with the minimum of two years of premedical work considerable preference is often given those who have more than the minimum of 60 semester hours required for entrance. We have made a study of the relation of semester hours premedical work to success in the first year of medical work. To summarize our results here, studying almost a thousand students in medical schools admitting students with varying amounts of premedical credits from 60 semester hours up, we found a correlation between the number of premedical credits on admission and freshman medical grades of only slightly above zero. The distribution of grades in the group having only the minimum of 60 semester hours did not differ materially from the distribution of grades for the group having 120 or more semester hours. Exactly the same percentage in each group shows freshman medical averages of 90 or above, and the differentiation in other grade ranges was very slight between those who had had two years of college premedical preparation and those who had four or more years.

Figure 7 gives a summary of the efficiency of the various criteria in predicting failures in freshman medical work.

CONCLUSIONS

From our study, it appears that Aptitude Tests furnish a very useful criterion for predicting success in the medical school. It seems further that best results can be obtained by a combination of test results with other criteria for selecting students, especially with premedical grades. No one criterion gives a perfect prediction and only prolonged experimentation will show what is the most reliable combination of criteria. The predictive value of personal interview ratings does not seem to be high, but this factor should be studied further in a larger number of schools and under better controlled conditions.

Following the presentation of this report at the last meeting of the Association of American Medical Colleges, it was unanimously voted to make the Aptitude Test a normal requirement for admission to medical schools. On February thirteenth of this year the test was given in all premedical schools in the United States to students applying for admission to medical schools this year. Each medical school receives from our office a total distribution of all the several thousand students who are applying for admission to medical schools together with a list and the decile ratings of the students who are applying to that particular

school. A large percentage of the medical schools are following the plan of counting this Aptitude Test rating one-third in admitting the students, the other two thirds being given to premedical grades and interview and personality ratings. This has the advantage of giving a better balanced set of criteria for selection. The test results enable a very wide comparison to be made between those applying from the country as a whole. The premedical grades give a comparison of students in one particular school; and the interview gives a general summing up of the students' individual characteristics. This method also enables the medical schools to get a list of the students applying to them by the fifteenth of March.

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Employee Interviewing and Employee Representation

By R. S. Meriam, *Graduate School of Business Administration, Harvard University*

The Hawthorne experiment in intimate interviewing of large numbers of employees, now in its third year, has challenged the attention of executives in many industries. French, German, and Italian translations of the Personnel Journal *articles by Pennock, Putnam, and Mayo*[1] *have been circulated in Europe through the International Management Institute. Mr. Meriam here compares the interview procedure with the employee representation plan as a means of ascertaining attitudes, discovering situations to be corrected, and appraising the effectiveness of labor policies and supervisory practices.*

Both employee representation and employee interviewing, considered as tools of management to ascertain employee attitudes and grievances, are devices to permit higher executives to check the effectiveness of a company's labor policies. Their successful introduction depends upon the spirit and motives of the higher executives, and reasonably good labor relations are prerequisite. Each plan has its peculiar merits and defects. Employee representation is direct and inexpensive. It may fail to deal with obscure and irrational grievances. It has some of the defects found in any political machinery. Employee interviewing gets at the individual's total situation and may help him through his peculiar difficulties. Interviewing is expensive and analysis of the data obtained is difficult. Because of the different characteristics, the two plans might be used to supplement one another. The attitude of the higher executives is all important.

THE purpose of this paper is to compare employee representation and employee interviews as tools of management in ascertaining and meeting employee grievances. Neither employee representation nor employee interviewing is necessarily a tool of management; but we are concerned only with such systems of employee representation as are introduced by the employer as a part of his own labor policy. Employee representation is here limited to the adjustment of grievances. Representation in other forms, as on safety committees and committees for restaurants, clubs, and sports, presents quite different problems.

Employees may be interviewed by

[1] Personnel Journal, 1930, vol. viii, no. 5, pp. 296–332. Also vol. ix, no. 1, pp. 82–85.

all sorts of people for an almost endless variety of purposes. We are here concerned only with organized, systematic interviewing by a representative of the management to discover the workers' attitudes and grievances. The "open door" policy, whereby an employee may bring any matter to the attention of one of the higher-ups, is neither organized nor systematic. The employee interview plan is essentially that used in the Hawthorne plant of the Western Electric Company. It has been described by G. A. Pennock and M. L. Putnam who have charge of the work, and by Professor Elton Mayo who is associated with them.

There are five essentials to the employee interview as the term is used here. First, the employee to be interviewed is not one who has expressed a desire to present a grievance, but is selected by the interviewer. Second, the interview is private and the identity of the employee is not disclosed. Third, the employee is not examined on any set list of questions, but is encouraged to express freely his own opinions and wishes with little guidance from the interviewer. Fourth, the employee is not asked to present, as a representative, the views of his group, but is asked to express his personal and individual opinions. Fifth, many, if not all, the employees from a department or branch are interviewed. These are the characteristics of the interview plan we are here discussing.

Both employee interviewing and employee representation are used to evaluate the results of a company's labor policy. With the elaboration of the manufacturing processes, many companies have had to resort to some system of checks and balances. Auditors check the work of accountants and other company officers. Cost systems are introduced to check the work in warehouse and factory. As the number of employees increases, it becomes increasingly difficult for the higher executives to ascertain the actual results of the company's labor policies on the employees' morale and willingness to work. Their main reliance must be upon reports from the line of supervisors having authority over the workmen. The gang bosses and the foremen, with their superiors, have other duties however; and when reporting on employees' attitudes, they are in the difficult position of appraising their own efficiency or even of confessing publicly their own sins. They may well hesitate to criticize company policies or may be so "loyal" that they cannot see where company policies are mistaken. All through the works, moreover, an attitude of reticence and restraint may have grown up. The men may have been taught that "silence is golden." A superior will always have difficulty in getting his subordinate's real attitude. For these reasons, a number of large industrial undertakings have felt it wise to go around the regular line of authority and set up special organizations to discover employees' attitudes.

I do not wish to imply that employees in large establishments have more grievances or poorer morale. I know of no evidence that such is the case. The executives of smaller establishments may not feel the need of setting up control organizations. Irrespective of size, much depends upon the feelings

of the higher executives and other officers. Those in authority may be quite used to checking devices of other sorts but may be resolutely opposed to any check-up on their handling of employees. They may pride themselves on their intuitive understanding of human nature and have the practical man's suspicion of any wisdom in such vague matters except that of first-hand experience. Technical improvements in a jig, for example, are more easily demonstrated. But the chief objection is a strong emotional opposition to "abdicating the functions of management" destroying "authority" and upsetting "discipline."

Only where the higher executives feel keenly the importance of employee morale and where good employee relations are considered an essential objective, are they ready to insist upon investigation of employees' attitudes. Only where the higher executives feel strongly on the subject are they able to overcome the powerful emotional opposition and enlist the support of the entire staff in any measure to check on the handling of employees.

Many motives come into play. The desire to increase production, lower costs, and increase profits is certainly not the only basis for an interest in employee morale. Employee morale can become an interesting subject for scientific investigation where knowledge is sought for its own sake. Most important, good employee relations may come to be considered a part of the job, an end to be sought for its own sake, an end as important as satisfying consumers' wants or paying dividends. Some such motives as these are behind any sincere attempt to discover employee attitudes and grievances. With the motivation behind insincere or counterfeit plans we are not concerned here.

Reasonably sound labor policies and reasonably good employee relations are a prerequisite to either employee representation or employee interviewing. If conditions are bad, either plan will probably meet so much suspicion that it cannot function. The interview plan will fail where the employee is suspicious or has learned to feel that management is not seriously interested in improvement. Employee representation cannot succeed where natural leaders fear "victimization" or where the voters feel that the offices will be turned over to the bosses' favorites who in turn will try to weed out the dissatisfied elements. Confidence in the goodwill, sincerity, and efficiency of the management is absolutely necessary. Both plans can only serve as devices for making good relations better. In some bad situations, either plan might bring on a crisis.

Although both plans have much in common in their aims and prerequisites, each has its peculiar advantages and disadvantages. Employee representation is a relatively quick and direct device for getting at the most important grievances felt by the greatest number. For that reason, it is relatively inexpensive. Expression of a grievance is directly connected with consideration and adoption of measures to remedy it. Immediate and visible results may be obtained; the employees and their representatives may have both the result and pride in accomplishing it. These principal benefits of representa-

tion may be obtained in many forms. The list of benefits could be made as long as the list of possible grievances. They have been obtained where the higher executives genuinely desired to ascertain and redress the employees' grievances.

On the other hand, we may make a long list of possible errors and defects. These possibilities should be recognized, even though they are unlikely where the higher executives warmly support the plan and make every effort to have it succeed. It is possible that the representation plan may distort the picture. Not all grievances are clear and rational. The employees and their representatives may, like many other humans, fail to understand their own situation and grasp at the first formulation of their grievances which appears plausible and rational. The representatives of the management may fail to deal with such a grievance either by dismissing it as unfounded or by treating it as a real ailment. Moreover, the workers' representative may ignore some grievances as a censor, diplomat, or politician. The views of a racial or religious minority may be suppressed. The representative may feel forced to select for presentation the grievances which he thinks the management will be willing to consider. He may be concerned about his political future and emphasize such grievances as are likely to attract votes in a coming election. It is also possible that the employee representation plan, where successful in voicing grievances, may leave favorable attitudes unexpressed. Like other political machinery, employee representation is likely to fail to give an accurate picture of the state of opinion.

As politics may degenerate into partisanship, so may employee representation create grievances. I do not refer to the grievances of unsuccessful candidates and their supporters. The grievances of a number of employees may be adopted by the employees as a body. Through organization, group loyalty may be aroused so that grievances are not individual but group; every member may have the grievances of others superimposed upon his own. A small group of employees may feel that the chance of getting a full hearing and a favorable decision depends on persuading others that they have the same complaints. The up-shot may be that the employees become an organized group opposed to management. The political machinery may gather individual grievances and transform them into something plausible and rational, but far removed from the real problem with which the management should deal. The real problem is obscured and a new one added to it.

These dangers appear possible, but they must not be exaggerated. They are not all simultaneous possibilities; many of them are mutually exclusive. For example, the restraint upon the expression of grievances which the management would consider disloyal and unreasonable is likely to prevent the growth of group partisanship. We cannot argue that employee representation will keep grievances smothered and at the same time let them burst into flame. The first of the alternatives is more probable. No one can be sure how many grievances

representation plans leave unexpressed. One observer, in whose carefulness, competence, and shrewdness I have great confidence, recently told me that representation plans leave many important grievances undisclosed. Trade unionists insist that representatives are so conscious of their lack of coercive power that they do not raise the burning issues. The experience of companies which have used employee representation for a number of years would indicate, however, that it does add significantly to the executives' picture of the situation, even though it does not uncover all of the grievances. Their experience indicates that many of the dangers remain only possibilities which appear and become real under particularly adverse circumstances. The principal adverse circumstance is lack of sincerity among the higher executives.

The dangers and limitations of employee representation are essentially concerned with the political machinery. Absence of political machinery is the chief advantage of the interview plan. The employee is interviewed as an individual. His attitude is his own, and may or may not be shared by others. He is not asked for grievances, but may express favorable and unfavorable opinions about the job as he sees fit. He is not required to propose remedies or to listen to counter arguments or counter proposals. He speaks freely and is not held to sustained reasoning. He may get benefit from "blowing off steam" or "getting it off his chest." The interview plan is unquestionably superior as a means of finding out what is on the employee's mind. If extended to any considerable number, the result is much more accurate than the representation scheme. The data are first-hand and original, not the second hand observations of a reporter-advocate.

As a scientific tool to get a picture of the total situation, the superiority of the interview plan makes it quite distinct. Even more important is its distinctive merit as a tool to deal with irrational human nature. The interviewer is a trained specialist in the service of the higher executives. The higher executives usually have not reached their positions because of success in handling the intricate problems that grow out of placing the human organism in the environment of modern industry. Specialist assistants in this field, with their peculiar techniques, are as necessary here as elsewhere. The higher executives have the task of selecting the specialists and coordinating their efforts. A workman will not "blow off steam," or express and straighten out his preoccupations and rationalizations by military command. Special training is necessary to elicit the full expressions, to listen to the rationalizations and to uncover the real problems and to exert a direct healing influence on the individual's peculiar and possibly distorted grievances. The specialist's technique for *listening* is a distinct characteristic of the interview plan.

On the other hand, a collection of employee interviews is a mass of vague and conflicting observations, some of them irrational, perhaps unintelligible, and often irrelevant to problems of managerial control. Collecting the interviews is inevitably expensive and more expense is necessary to analyze the data so as to permit the higher execu-

tives to formulate problems and policies. It would appear difficult to get and train interviewers. This has not been the Western Electric Company's experience. There is some danger that distortion will enter the interviewer's report based on his memory or his notes. The danger of distortion is much greater at the next step where the interviews must be analyzed. Some sort of frequency distribution of employees' comments is essential to give the higher executives a picture of their problem. Distortion may enter either when the employee's comment is taken literally or when it is interpreted. Error may creep in when it is decided what comments are to be grouped together: a few classes involve loss of the full meaning of individual comments, and many classes, loss of intelligibility. When these difficulties and the expense of meeting them are considered, some executives will prefer to ask the workers' representative to state their attitudes and grievances.

The anonymity of the interview creates some difficulties in meeting the grievances expressed. Some of the grievances cannot be handled directly and promptly without disclosing the source of the information or giving a strong basis for inference. Complaints about supervisors present peculiarly difficult problems. We have the tradition of civilized countries that the accused shall not be condemned without being confronted by the witnesses. There are at least two sides to the case. Can the management act without giving the supervisor a hearing—without destroying the anonymity of the interview? At the Western Electric plant, the comments on supervision are not made the basis for executive action but are used only in the supervisors' training conferences. But executive action is not impossible. If the record shows an accumulation of supervisory complaints in a department, the identity of the individuals may be kept secret. Moreover, executive action need not be that of a judge in a criminal court. Certainly, if the supervisors are to do good work, their own superiors must set them a good example. The difficulties here are not insuperable. It is highly important that the employee should feel that his grievances are taken seriously.

The cost of the scientific thoroughness obtained by the interview plan can be reduced by decreasing the size of the sample. Not every employee need be interviewed once a year. A broad audit is desirable periodically. For a time, after a broad picture has been obtained, the interviews may be concentrated on the weak points disclosed by the survey of all departments, where new methods are being introduced, or where turnover and absenteeism are high. It is most important, however, that the interview should not be considered an emergency measure. Where some interviewing is going on all the time, it may be expanded when necessary and directed to selected departments. But its sudden and conspicuous introduction into a critical situation would probably do more harm than good.

The value of interviews must not be estimated by the amount of new and disturbing information obtained. The value of an audit is found not in the frauds uncovered. If the interviews only tell the higher executives what

they know already—to take an extreme and unlikely case—it has the value of assuring them that their knowledge is complete and accurate.

The foregoing contrast of the two methods, employee representation and employee interviews, has disclosed so many differences that they cannot be considered competing tools for accomplishing the same results. Each has defects. Some executives will reject both, and some will consider one worthwhile and the other expensive or dangerous. Both might be used simultaneously. The representation plan may be relied upon to discuss measures to meet rational group grievances, while the interview plan may be used to make sure that no grievances are kept back and that irrational individual attitudes are dealt with. At the present time, however, no company is using both methods. Whether this combination ever appears, depends, like most of the experimentation in this field, upon the attitudes and feelings of higher executives. Upon what they consider to be their duty or responsibility and upon the confidence which they can arouse in subordinate officials and in rank and file, depend the methods and their success.

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Earnings of Machine Tenders and of Bench Workers

By Elisha F. Bliss, Jr., *New York*

To what extent are we really slaves to the machine? We shall eventually know much more about the actual effects of machine operation on output and earnings as industrialists analyze and publish just such specific data as Mr. Bliss presents in the following comparison of earnings of 173 machine tenders and 138 bench workers.

Distributions of piece work earnings of (1) machine tenders and (2) bench workers are given. The curve of the former group is very definitely skewed toward the high-earning end and is abruptly terminated at this end. With the bench workers, who use machines only as incidental tools, skewness is in the opposite direction and the upper end of the distribution tails out. Machinery is seen to limit earnings, and yet on the other hand to be an important source of motivation. It acts as a pace-maker. Methods of controlling skewness of wage distributions are discussed.

TO ILLUSTRATE differences in types of distributions of earnings and some of the problems that arise from an analysis of the factors operating to produce these differences in "types," there is presented in this paper a discussion of the earnings distributions of two groups of women straight piece work employees of a large industrial concern in the Metropolitan area of New York City.[1]

[1] Under the system of straight piece work used by this concern, the person is paid a fixed amount for each unit of output, regardless of the quantity of the output. Once the piece rate is set it is the policy of the company not to change the rate unless a radical change is made in the layout of the operation.

SELECTION AND TREATMENT OF DATA

The first group is composed of 173 machine tenders engaged in unusually homogeneous work. The duty of each of these employees is to keep several machines in operation. The second group is composed of 138 bench workers, not engaged in work as homogeneous as that of the first group, but which is distinctive in that, where machines are used, they are employed as tools in the operation.

For each group, a calendar week was selected during which the group contained a minimum number of new employees and during which no major exceptions occurred in the routine of the work. In this way, the groups

were approximately equated for efficiency. The two weeks which were selected occurred in the spring of a year when "normal" economic conditions prevailed, and with only six weeks intervening, so that it is improbable that market or seasonal conditions affected the groups differently.

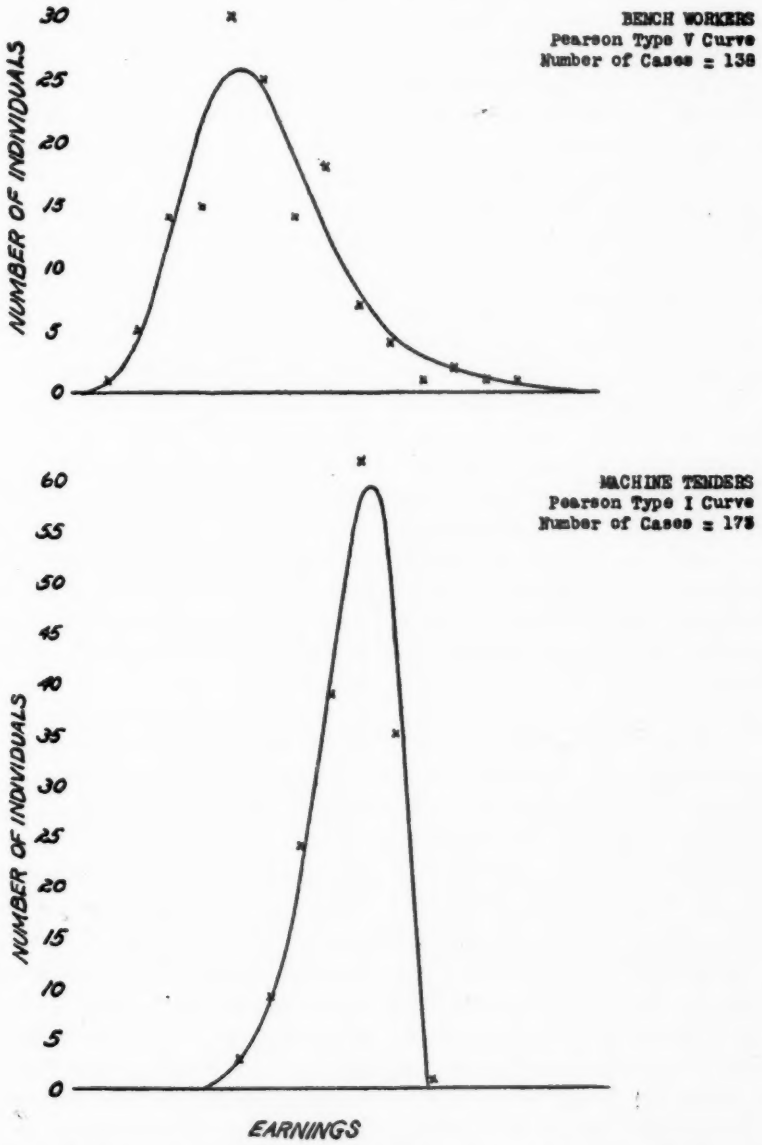

FIG. 1. EARNING CURVES FOR BENCH WORKERS AND MACHINE TENDERS

The average hourly earnings of the

individuals in each group were computed on the basis of the week's earnings, and were found to distribute as shown by the crosses on figure 1. These distributions were fitted by curves of the Pearson[2] series indicated by the Pearson criterion. The curve used for the bench workers is a Type V curve, while that used for the machine tenders is a Type I curve.

While it appears from the data that many of the differences in these distributions are significant, the accuracy of the choice of Pearson curves can be better judged from the following analysis than from the data, because of the small number of cases found in each group. It may be noted in passing, however, that distributions of the earnings of these groups, subsequently obtained, have been found to exhibit essentially the same characteristics of contact and skewness as those which are given here for purposes of illustration.

ANALYSIS OF DATA

From a subjective examination it appears that the differences in skewness and contact of these distributions are determined chiefly as follows:

Limitation of earnings due to machinery. When speed is constant, the output of a machine approaches its maximum as the machine approaches continuous operation. In the case of the machine tenders, it is the duty of each to keep five machines in operation. Under the conditions existing at the time this study was made many of the women were able to keep their machines in operation without continual effort; that is, less than 20 per cent of the operator's time was spent keeping each machine in operation. As a result it was possible for these operators to obtain almost maximum output from their machines. It is interesting to note how closely the mathematical curve conforms to theory by limiting abruptly the upper end of the distribution.

In the case of the bench workers, on the other hand, the proportion of the operation time taken by machinery is negligible; the output of the operator is dependent primarily upon her speed and sustained effort, both of which are limited only by human ability and endurance. We would expect, therefore, to have the upper end of the distribution of bench workers tail out, or exhibit high contact as it might be called.

Motivation to earn and skewness. It is probable that the group of machine tenders represents a more highly motivated group of earners than the group of bench workers. Not only is the basic starting rate higher in the case of the machine tender, but the conditions of work are so much less pleasant that girls indifferent to financial reward would not be attracted to it. This selection is reflected by the fact that the average hourly earnings of most machine tenders are above the average for their group, while the average hourly earnings of most bench workers are below the average for their group.

The machine as a pace-maker. Where the larger proportion of work

[2] For methods of fitting these curves, see: W. Palin Elderton, *Frequency Curves and Correlation*. London: Layton; and Karl Pearson, *Tables for Statisticians and Biometricians*. London: University College.

is done by a machine, it is probable that the machine tends to set a pace for the operator. Where the operator has a number of machines to run, as in the case of the machine tenders, her job becomes that of keeping all the machines running, which may resolve itself into a kind of game. In hand operations such as are performed by bench workers, however, there is nothing comparable to this "machine motivation," unless it is the preservation of rhythm in the case of certain power press operators. Games that the operator may invent, such as timing her operation, are forced and artificial, and since they are within her control are apt to be dropped in moments of fatigue. The differences in the skewness of these distributions may be partly accounted for by machine motivation.

GENERAL ASPECTS OF THIS STUDY

This study apparently illustrates two facts: (1) that the per cent of time operators have over and above that required to keep machines in operation is a determinant of contact at the upper end of their earnings distribution, (2) that the motivation which operators possess determines the skewness of the distribution.

Questions arise: What contact and skewness should an ideal distribution of straight piece work earnings exhibit? How can the contact and skewness of such a distribution be controlled?

Ideal contact. The degree of contact which a distribution exhibits is of psychological, sociological, and economic importance. Consequently, optimum contact has frequently been discussed in connection with wage incentive plans.

Optimum contact remains largely a matter of opinion, however, because some of the facts which must be considered are diametrically opposed. If the upper end of the distribution is limited, it tends to prevent over-exertion on the part of the operator, but on the other hand, it restricts the earnings possibilities of the exceptional operator. High contact allows every operator to produce in proportion to her ability, but where machines are involved this is often impractical because of the high overhead of the machines.

Ideal skewness. The highly motivated individual probably works to his own and to the company's best advantage. Following this line of reasoning the writer believes that negative skewness (as in the case of the machine tenders' distribution) is more to be desired than positive skewness (as in the case of the bench workers).

Control of contact. The contact of a distribution of earnings becomes more abrupt as the period which one of its average operators spends in waiting for the completion of the mechanical phase of an operation increases in proportion to the time of the operation. If we wish to alter the degree of contact, therefore, we must change the proportion of operation time a worker spends in enforced idleness.

To avoid high contact such as we might find on a hand operation, we might substitute machinery which is of an automatic nature. To eliminate contact such as might be found where automatic machines are in use, we

might (1) give the operator additional machines to run, or (2) speed up the machines.

Control of skewness. Motivation, in the ordinary sense of the word, may be said to be derived from three sources:

1. Home conditions which create desire to earn money
2. Nature of the job, conditions or circumstances of work
3. Physical make-up of the worker

The third of these sources of motivation cannot be discussed at length in this article. There is reason to believe, however, that individual differences in motivation are often due to physiological conditions.

(*1*) *Home environment.* The problem of stimulating home environment was once summarized by a supervisor who said, "If I could induce my employees to spend more money or to save more money, they could be induced to make more money." Supervisors of piece workers have found from experience that the problem is not so much how to maintain high earnings once they have been attained, as how to attain them.

The supervisor may sometimes assume the rôle of a social worker to assist an employee in obtaining a satisfactory financial arrangement at home. A case in point is that of a girl who was about to be discharged because her piece work earnings were not satisfactory. When the foreman interviewed her he learned that she turned over to her parents her entire earnings, in return for which she received a small fixed weekly allowance. Consequently, the girl had little interest in the amount of money she earned. The foreman visited the girl's parents, and in the end brought about an agreement whereby the girl would be given whatever money she should earn above a stipulated amount. This girl's production jumped immediately and she became a first class operator.

(*2*) *Job environment.* There are many ways in which the motivation of an individual may be increased within the plant. An argument for the installation of automatic machinery is that it tends to sustain and perhaps increase effort. The result is an increase in production per individual over and above the increased production due to the labor saving machinery. An automatic conveyor such as a progressive assembly line may have a similar effect upon production.

The positive value of personnel work is so generally recognized that it does not need to be discussed here. Liberal personnel policies on the part of a concern tend to develop confidence in the attitude of employees toward it, and tend to eliminate factors of discontent which militate against efficiency in production.

Competition is a powerful stimulus to production. While the fervor arising from a competitive situation may be of limited duration, the increase in earnings which such a competition effects is often made permanent by its effect upon outside environment. Competition as a source of motivation is doubly important because it is within the control of the immediate supervisor.

Competitive situations arise in almost endless variety. Two rather unusual cases of what might be called spontaneous competition were re-

cently brought to the writer's attention. Twin sisters (probably identical twins) working side by side far excelled the production of any other operators on the same job. Spurred by the consistent and unusual earnings of one exceptional operator, a free-for-all race developed among other operators on the same job in an attempt to equal her record.

Group contests as well as individual contests can be stimulated by the supervisor. Judicious use of charts showing production records, highest efficiency, highest quality, least scrap, least accidents, best attendance, etc., results in competition which in turn increases efficiency and earnings.

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Visibility of Objects as Affected by Color and Composition of Light

Part II. With Lights Equalized in Both Brightness and Saturation

By C. E. Ferree and Gertrude Rand, *Wilmer Ophthalmological Institute, Johns Hopkins Medical School*

This article is continued from the April number of the Personnel Journal. *Part I dealt With Lights of Equal Luminosity or Brightness.*

In THE present series of experiments the spectrum lights were equalized both in saturation and luminosity or brightness and the tests were repeated for the same observers. An advantage, not so great but still considerable, was found for the lights in the mid-region of the spectrum.

The investigation was supplemented by the test for fatigue or loss of efficiency noted in the Introduction. That is, the power to sustain clear seeing was obtained before and after three hours of reading with the page illuminated by red, yellow (amber), green and blue filtered lights (dipped lamps), equalized in luminosity and saturation. It was obviously impossible to use this test in the experiments with spectrum light. The test surface and reading page were illuminated by the same light and were carefully matched in hue, saturation and brightness. Also a spectrophotometric analysis was made of the light reflected from the reading page. A comparison of the results before and after reading shows that the eye held its power to sustain clear seeing best under the amber light. The amber light was also found by test to show the least tendency to produce discomfort.

Apparatus and Method of Equalizing Saturation and Luminosity

In Part I the difficulty of making a complete separation of factors when dealing with colored light was pointed out. In that series of investigations wave-length, hue and saturation were varied while purity and photometric intensity or brightness were held constant. The difference in the results obtained had, therefore, to be ascribed to differences in wave-length, hue and saturation,—the factors which were varied. But as we have already noted, wave-length as a factor in clear seeing affects the resolving power of the refracting media. In terms of this factor, the highest acuity would be expected for the short wave-lengths of

the spectrum. The results of the test showed, however, that the highest acuity, speed and power to sustain are given by the lights in the mid-region of the spectrum. This indicated that either hue or saturation or both were dominant factors in the results obtained, not wave-length. It is the purpose in this Part to carry the analysis still further. Preliminary experiments made by varying the saturation for several hues showed that saturation is unquestionably a factor. It remained only to make the test for hue. With this in mind the present study was planned. That is, the preceding experiments were repeated for the same observers with the lights equalized both as to saturation and brightness. It is not possible, however, to equalize the lights of the spectrum both as to saturation and brightness and not alter their purity. The equalization may be made for either alone by the proper regulation of intensity, but not for both because they sustain a very different relation to change of intensity. The equalization for both can not be made without the introduction of a small and variable amount of white light. This complicates the analysis by leaving both hue and purity as outstanding variables,—a complication which is unavoidable. That purity of light was not the determining factor in the results obtained, however, is shown by the following facts. (1) Results were obtained for the light from the yellow filter which had been matched to the spectrum yellow and used as a standard against which to match the other spectrum lights. The light from this filter was by far the most impure of all that were used; yet next to the spectrum yellow it gave the best results. Indeed the results obtained for it were only slightly inferior to pure spectrum yellow. (2) A ranking of the lights as to order of merit for clear seeing does not at all correspond to their ranking as to purity. Red, for example, with which the greatest amount of white light had to be mixed in making the equalization of saturation gave much better results than either blue or blue-green with which a considerably smaller amount of white light had been mixed. Comparisons in support of this point may also be made between orange and green, blue-green and blue for the lower intensity; and between orange and green for the higher intensity. In any event it is safe to conclude that colored lights equalized both as to saturation and luminosity with as little difference in purity as is possible have not equal value as illuminants for the printed page; and this is as far as we need go to meet the practical situation. A similar conclusion may be drawn with regard to the coloration of the printed page.

The following apparatus (figures 6 and 7) were used to illuminate the test surface with spectrum light equalized as to saturation and luminosity: (1) The minimum deviation spectroscope described in Part I. (2) A lamp-house *A*, figures 6 and 7, placed to the left of the spectroscope furnished the white light to be mixed with the spectrum light in order to vary the saturation of the colored illumination. This lamp-house was provided with a projection tube the posterior end of which was covered with a cap containing an

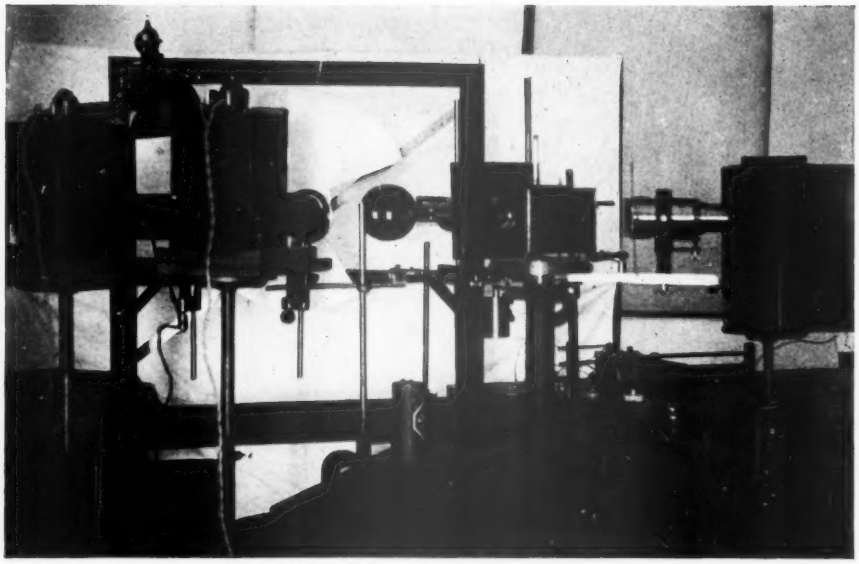

FIG. 6. TEST APPARATUS, FRONT VIEW

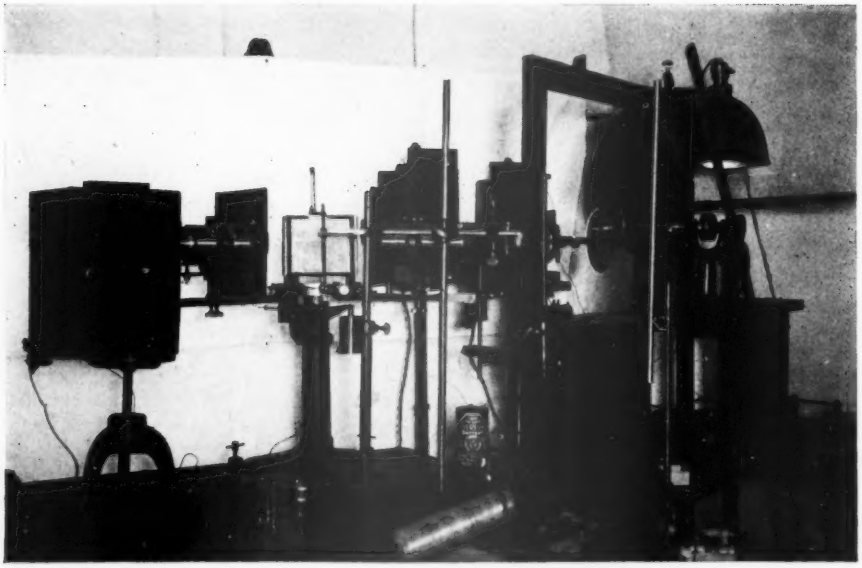

FIG. 7. TEST APPARATUS, REAR VIEW

oblong aperture 3.5 x 5 mm. In the anterior end of the tube was inserted a lens *L*, focal length 150 mm., diameter 65 mm. The aperture was of such a size and shape that its image focused by the lens *L* on the test surface coincided exactly with the area illuminated by the spectroscope. In order to provide for the uniform illumination of this aperture the lamp-house was lined with opal glass, sand-blasted on one side, and was illuminated by a 100-watt type C lamp installed tip down in the roof of the lamp-house with its filament well above the aperture. The light was filtered to daylight quality by a section of glass furnished by the Macbeth Daylighting Company. The intensity of light was varied by means of an iris diaphragm mounted at the end of the projection tube as closely as possible to the back surface of the focusing lens *L*. By the variation of these two components, the colored light from the spectroscope and the white light from the lamp-house, a wide range of saturations and luminosities was made possible for all of the colored illuminations. (3) A second lamp-house *B* also containing a type C lamp installed in its roof was used to provide by projection a field on the test surface of the saturation chosen as standard. This lamp-house was similar to lamp-house *A* and was placed to the left of it. On the forward end of its projection tube was mounted a filter-holder the base of which could be raised or lowered by an adjusting screw. By means of this screw a filter inserted in the holder could be made to travel across the beam immediately in front of the lens. This served as a simple and convenient color mixer by means of which the filtered light could be evenly mixed in finely graded proportions with the light from the lamp-house. The total intensity of the beam was regulated by an iris diaphragm mounted as in *A* just back of the lens. The operation of either of these controls, the filter-holder for grading the proportions of white and colored light and the iris diaphragm for the regulation of intensity, in no way interfered with the size, shape or evenness of distribution of light in the projected image. The optical principle on which these controls were based is simple. It may be stated briefly as follows. Every point in the image receives light from every point of the lens. The light from any segment of the lens therefore whatever its size or shape is evenly distributed to the image. In the above device the size of the segment, it will be noted, was controlled by the iris diaphragm; the coloration of the light it transmitted by the moveable filter, both controls being placed as closely as possible in contact with the surface of the lens back and front in order that each cone of rays focusing to a point in the image should be affected equally.

The aperture in the lamp-house was of such a size and shape that when it was imaged on the test surface an illuminated field was provided of the same size and shape as that given by the spectroscope. The various parts of the apparatus were so adjusted that these two fields were exactly contiguous. The illumination of both fields was measured with a Sharp-Millar illuminometer. When making the

measurements, the test plate of the illuminometer was substituted for the test surface upon which the images were projected.

The method of making the colorimetric and photometric match was as follows. The yellow of the spectrum mixed with a small amount of white light from lamp-house *A* was made the standard for the series. For the higher of the two intensities, for example, the amounts of white light and spectrum yellow were respectively 0.0102 f.c. (0.1098 m.c.) and 0.3014 f.c. (3.243 m.c.). The field illuminated by lamp-house *B* was then made equal to this in hue, saturation and brightness to serve as a secondary standard against which to match the other spectrum colors. By using the yellow filter of the Wratten and Wainwright series this match was not difficult to make with the controls provided. White light was added to the spectrum yellow in making up the primary standard for two reasons. (1) It had to be added to the other colors to equalize their saturation. It was deemed fairer for comparison, therefore, not to have the yellow of spectrum purity. (2) By lowering the saturation of the standard field the addition of white light caused the experiments to be conducted at a lower level of saturation. The effect of hue was thus subjected to a more rigorous test. That is, hues equalized for saturation at a high level of saturation would be expected to give greater differences in result than hues equalized at a low level of saturation.

In making a saturation and brightness match between colors differing in hue a situation is presented different from that encountered in making the ordinary photometric or spectrophotometric comparison. That is, if the fields are made contiguous, they are mutually influenced by physiological color induction or color contrast. To overcome this difficulty the test surface was covered with a disc of Hering velvet black paper on which were mounted two small oblongs of mat white paper, 1 × 1.5 cm., coefficient of reflection 85 per cent, with their nearlying edges 2 cm. apart. The center of one of these oblongs was placed at the exact center of the test-object; the center of the other, at the center of the standard field provided by lamp-house *B*. This amount of separation between the two fields was sufficient to eliminate all detectable physiological induction, but not great enough to render the comparison difficult to make at the distance from which the surfaces were viewed. The elimination of color induction was tested both by simultaneous and successive judgments by exposing in turn

TABLE 1

Showing the foot-candles of light, daylight quality, added to the different spectrum illuminations to make them equal in saturation and luminosity to the yellow chosen as standard at intensities I and II

COLOR OF ILLUMINATION	INTENSITY I (0.075 F.C.)	INTENSITY II (0.3116 F.C.)
Red (660 mμ)	0.0432	0.16
Orange (624 mμ)	0.0252	0.108
Yellow (587 mμ)	0.0102	0.0102
Yellow-green (563 mμ)	0.0088	0.0102
Green (522 mμ)	0.0176	0.088
Blue-green (501 mμ)	0.0226	—
Blue (488 mμ)	0.020	—

each field to the light and shutting off the light from the other field.

Two intensities of illumination were used: Intensity I, equal to 0.075 f.c. (0.81 m.c.) and Intensity II equal to 0.3116 f.c. (3.35 m.c.). These intensities were the same as those used in the preceding series of determinations for

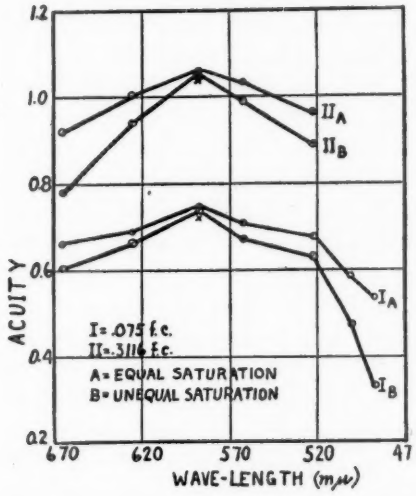

FIG. 8. SHOWING THE EFFECT OF CHANGE OF WAVE-LENGTH ON ACUITY AT 0.075 AND 0.3116 F.C. OF LIGHT, INTENSITIES I AND II, UNEQUAL AND EQUAL SATURATION SERIES (3 OBSERVERS)

In this and the following curves the results of the filtered yellow light used as the standard against which to match the colors in saturation and brightness is indicated by a small cross.

the spectrum colors equalized as to brightness alone. In table 1 are given the amounts of white light (daylight quality) that had to be added to the different spectrum lights to give fields equalized in saturation and brightness at the intensities given above. The equalization was based on the average results of two observers practiced in making colorimetric and photometric judgments. The spectrum lights selected were also the same as those used in the preceding series of experiments.

ACUITY

Three observers were used in making these determinations. The test object and method of making the observation was the same as for the tests of acuity in Part I. The results are given in figures 8 and 9. For the sake of comparison the curves for the series of unequal saturations are repro-

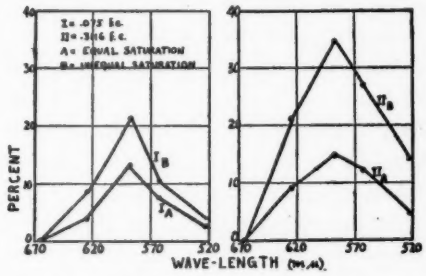

FIG. 9. PERCENTAGE CHANGE IN ACUITY PLOTTED AGAINST WAVE-LENGTH

The lowest value of acuity common to all the curves in figure 3 is taken as the base of which to calculate the percentage change.

duced in these charts. In figure 9 acuity (reciprocal of the visual angle) is plotted against wave-length for both Intensity I (0.075 f.c.) and Intensity II (0.3116 f.c.) when the colored illuminations are of equal saturation and photometric value (Curve A), and when they are of equal photometric value and of the unequal saturations of the prismatic spectrum of a high degree of purity (Curve B). It is seen from the curves that when the colors are made of equal saturation the yellow still gives the highest acuity. The order of merit

for the other colors is yellow-green, orange, green, red, blue-green and blue. The differences in acuity for the different hues are however considerably less than when the colors are of unequal saturation. It will be noted also that the acuity in the yellow for both intensities is slightly higher in the equal saturation series than in the series of unequal saturation. This was because the addition of 0.0102 f.c. of white light to the yellow in the former series reduced its saturation and produced a favorable effect on acuity in excess of whatever unfavorable effect may have been produced by rendering the light impure. The effect of the lessened saturation, it will be noted, is even greater in the more sensitive tests of speed of discrimination and power to sustain acuity. That the difference in effect was not due to a difference in the condition of the eyes of the observers was checked up by repeating the tests under the more saturated yellow light of high degree of purity used the previous year in the series of unequal saturations. The results obtained this year checked very closely throughout with those obtained under the same conditions in the previous work.

In order that we might have another opportunity to compare the effect of impurity with favorableness of hue, acuity was determined for the yellow filtered light which was used as a standard against which to match all of the spectrum lights in saturation and brightness. This light was low in purity but favorable in hue. The results for it are represented in this and the following charts by a small cross. It will be seen in these charts that although much less pure than any of the diluted spectrum lights, it gave a higher acuity, speed and power to sustain than any of those lights with the exception of the yellow.

In figure 9 percentage change in acuity is plotted against wave-length of light. Intensities I and II are plotted separately to avoid overlapping and confusion of the curves for the two intensities. In all cases the lowest value of acuity common to the curves in figure 8, the acuity for red (blue could not be obtained at the higher intensity), is taken as the base on which to calculate the percentage change. It will be noted in this and the charts for the other visual functions tested, that while there is a considerably greater percentage change for the higher intensity than for the lower in the unequal saturation series, there is very little difference for the two intensities in the equal saturation series. For example, the percentage change in acuity from red to yellow for the higher intensity of the unequal saturation series was 34.7, for the lower intensity 21.4; for the equal saturation series, higher intensity, it was 14.8, for the lower intensity 13.3. The greater percentage change at the higher intensity for the unequal saturation series is probably due to the greater difference in saturation between the colors at the higher intensity. That there was a greater difference in saturation at the higher intensity was noted by direct observation and is borne out by the data given in table I which show the amount of white light that had to be added to the colors to equalize their saturation at each intensity. For the

higher intensity these amounts ranged from 0.0102 to 0.16 f.c., a difference of 1469 per cent; and for the lower intensity from 0.0088 to 0.0432, f.c., a difference of 391 per cent. Indeed one might expect for the equal saturation series a slightly smaller percentage change from red to yellow for the higher than for the lower intensity because of the slightly lower level of saturation at which the colors were

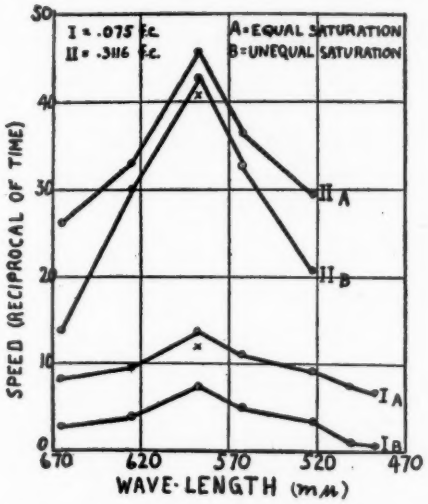

FIG. 10. SHOWING THE EFFECT OF CHANGE OF WAVE-LENGTH OF LIGHT ON SPEED OF DISCRIMINATION, INTENSITIES I AND II, EQUAL AND UNEQUAL SATURATION SERIES (3 OBSERVERS)

equalized at the higher intensity. That the change was slightly greater at the higher intensity was probably due to the much greater range of difference in purity at this intensity.

SPEED OF DISCRIMINATION

These determinations were made for three observers. The test-object, exposure apparatus and method of making the observation were the same as were used in the experiments in Part I. The results for speed of discrimination are given in figures 10 and 11. In figure 10 speed (reciprocal of time in sec.) is plotted against wave-length, and in figure 11 percentage change of speed is plotted against wave-length. In figure 11 the lowest value of speed common to all the curves of figure 10, the speed for red, is taken as the base on which to calculate the percentage change. In these

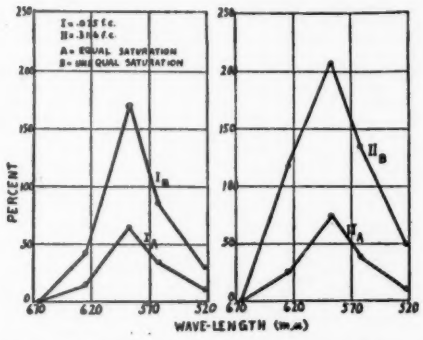

FIG. 11. PERCENTAGE CHANGE IN SPEED OF DISCRIMINATION PLOTTED AGAINST WAVE-LENGTH

The lowest value of speed common to all the curves in Fig. 5 is taken as the base on which to calculate the percentage change.

figures are plotted for comparison also the results of the test with unequal saturations obtained in the previous study. However, six observers had been used in that work, only three of whom were available for the present study. The curves based on the former work shown in figures 10 and 11 are plotted therefore only from the results of these three. The percentage change from red to yellow for the equal saturation series, lower intensity, was 65; for the higher intensity, 74.

For the unequal saturation series, lower intensity, it was 170; for the higher intensity, 208.

POWER TO SUSTAIN ACUITY

The test-object, recording apparatus and method of making the observation were the same as those described in Part I. The results for power to sustain acuity are shown in figures 12 and 13. In figure 12 the ratio, time seen clear to time seen

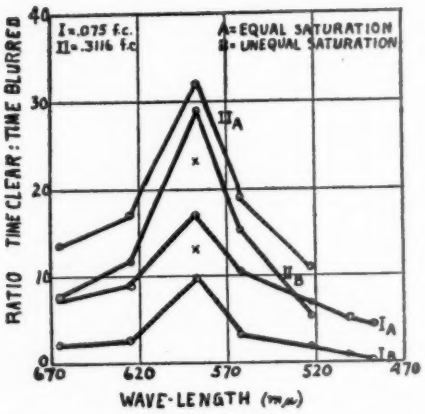

FIG. 12. SHOWING THE EFFECT OF CHANGE OF WAVE-LENGTH OF LIGHT ON THE EYE'S POWER TO SUSTAIN CLEAR SEEING OF THE TEST-OBJECT FOR 3 MINUTES, INTENSITIES I AND II, UNEQUAL AND EQUAL SATURATION SERIES

blurred, is plotted against wave-length and in figure 13 percentage change in this ratio is plotted against wave-length. In figure 13 the lowest value of this ratio common to all the curves in figure 12, the value for the green, was taken as the base on which to calculate the percentage change. The percentage change in this ratio from green to yellow for the equal saturation series, lower intensity, was 146; for the higher intensity, 190. For the unequal saturation series it was for the lower intensity 379; and for the higher intensity, 476.

In order to make possible a comparison of the effect of change of wave-length on the different visual functions when the saturations of the colors are equalized, figure 13 is given in which all of the curves are plotted on the same scale and represent the results of the same observer. The curves are plotted for the lower of the two intensities. In all cases the lowest value

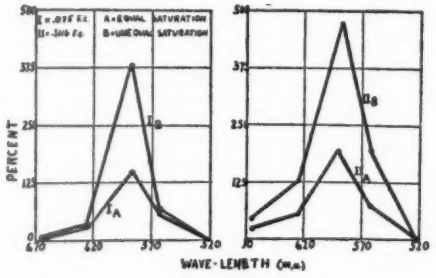

FIG. 13. PERCENTAGE CHANGE IN RATIO TIME CLEAR TO TIME BLURRED PLOTTED AGAINST WAVE-LENGTH

The lowest value of power to sustain acuity common to all the curves in figure 7 is taken as the base on which to calculate the percentage change.

common to all the functions tested was taken as the base on which to calculate the percentage change. This was the value of the blue. The percentage change from blue to yellow for acuity is 48; for speed of discrimination, 99; and for power to sustain acuity, 295. Similar curves plotted from data when the colors were not equalized in saturation showed that the percentage change from blue to yellow was for acuity 108; for speed of discrimination 999; and for power to sustain acuity 15,883.

EYE FATIGUE OR LOSS OF EFFICIENCY

A comparison was also made of the power to sustain acuity continuously for 3 minutes before and after three hours of reading under colored lights equalized as to saturation and brightness. The lights used were obtained from red, yellow (amber), green and blue tungsten lamps dipped by the N. Y. Calcium Light Co. and guaranteed by them to burn 20 hours without change of transmission. The amber light, the least saturated of the series, was selected as the standard for the illumination of the reading page and test-object. Because of the difficulty of getting equal intensities and saturations at the point of work with general lighting, the tests were made with local lighting given by a single unit, a one-burner student lamp of the standard type. An opaque shade of the same size and design was substituted for the green shade of this lamp in order that the tests might be made with the light proper to the illuminant, unmodified by the small percentage of light which filters through the shade. The lamp was placed behind and to the left of the observer in the position that was judged by several observers to give the most favorable conditions for reading. This position may be roughly specified as follows. The angle with the median plane of the observer made by a plane passing vertically through the center of the unit was approximately 21 degrees; and the line in the latter plane connecting the bottom of the shade with the center of the reading page formed an angle of approximately 39 degrees. The reading page was supported by a rack fastened to the upright to which was attached the mouthboard used by the observer in taking the 3-minute record before and after work. This rack was inclined at an angle of approximately 30 degrees with the vertical. To insure that the same amount of light fell on the reading page in each case, the brightness of the page was measured by means of a Sharp-Millar illuminometer with the test-plate removed and calibrated to give readings directly in c.p. per square inch. For the control of the operating current all of the lamps used for the illumination of either the reading page or test-object were connected in circuit with an ammeter and rheostat.

In order to equalize the illumination of the reading page as to saturation and brightness for the different colored illuminants, two provisions were made. (1) The distance of the student lamp was changed by the needed amounts. (2) An auxiliary lamp-house provided with an adjustable diaphragm was used, the distance of which from the reading page could also be changed. This lamp-house was furnished with a mat white diffusing lining and was illuminated by a type C Mazda lamp installed tip-down in the roof of the lamp-house with its filament well above the aperture. The changes of distance required for the equalization on the reading page for both units for the four colored lamps were not large. In making these changes care was taken to keep the angle at which the light fell on the page the same in all cases.

Owing to the angle of direction of the light and the distance of the lamp the test-object had to be illuminated from a separate source. For this

lamps exactly similar to the ones for illuminating the reading page were used, mounted in Ivanhoe-Regent steel reflectors of the intensive type, aluminum lined, placed in front of and to one side of the test-object at the distance and angle required to give the desired illumination. In order that the test-object alone should be illuminated and not the surrounding walls, objects, etc., the opening of each reflector was covered and an oblong aperture was cut of the size and shape

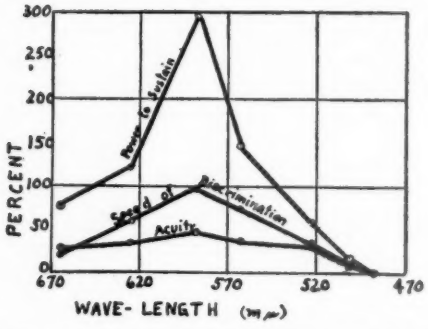

FIG. 14. SHOWING THE PERCENTAGE CHANGE WITH CHANGE OF WAVE-LENGTH OF LIGHT FOR ALL OF THE FUNCTIONS TESTED PLOTTED TO THE SAME SCALE, INTENSITY I

The value for blue is taken as the base on which to calculate the percentage change.

needed to give the cross-section of light desired. The position of this aperture in the opening of the reflector was chosen with reference to giving the most even illumination of the test-object. That is, the light was not taken directly from the lamp but from the most favorable part of the inner surface of the reflector. The test-object was made to match the reading page in hue, saturation and brightness. Before beginning each test of the series the eye was allowed a 50-minute adaptation period. The choice of the length of adaptation period was empirical, based on the interval that gave the highest reproducibility of the 3-minute test for power to sustain acuity.

Since the lamps employed were dipped especially for our purpose to give as nearly as possible equal saturation and brightness and were not of a well-known or standard type, it was deemed advisable to give a spectrophotometric specification of the illumination obtained. Further since white light had to be mixed in varying proportions with the colored light to produce the twofold equalization in saturation and brightness, the spectrophotometric measurements were made of the light reflected from the reading page rather than of the light emitted from the lamp. For this purpose a small spectrophotometer was needed which could be mounted in appropriate relation to the reading page in position. A Nutting pocket spectrophotometer furnished by the

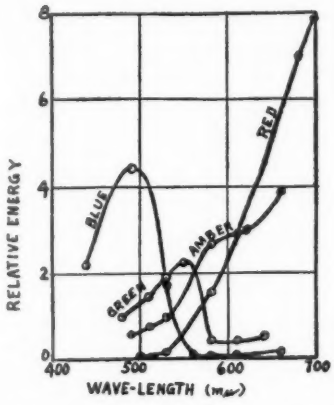

FIG. 15. SHOWING THE RELATIVE ENERGIES OF THE WAVE-LENGTHS REFLECTED FROM THE READING PAGE PLOTTED TO THE SCALE OF THE NORMAL SPECTRUM

Bureau of Standards was used. Inasmuch as this instrument was not provided with a wave-length scale and a slit for isolating the spectrum bands, the comparisons made were necessarily somewhat rough. The spectrum of the light reflected from the page was measured against that of a lamp (acetylene color at 98 volts) also furnished by the Bureau of Standards, the energy distribution of which was 700–510 mμ, for the amber from 668–492 mμ, for the green from 640–490 mμ; and for the blue from 668–439 mμ.

The spectrophotometric data have been presented in two ways: (a) by curves giving the relative energies throughout the spectrum plotted to the scale of the normal spectrum, figure 14, and (b) by curves plotted on Benford's web,[7] figure 15, designed

TABLE 2

Showing the tendency of the different colored illuminations to cause eye fatigue and discomfort

COLOR OF ILLUMINATION	BRIGHTNESS (CP. PER SQ. IN.) TEST-OBJECT AND READING PAGE	TIME	WORKING DISTANCE	TOTAL TIME CLEAR	TOTAL TIME BLURRED	TOTAL TIME CLEAR ÷ TOTAL TIME BLURRED	RATIOS REDUCED TO COMMON STANDARD	LOSS OF EFFICIENCY EXPRESSED IN PERCENTAGE CHANGE OF RATIO	MEAN VARIATION		TIME THRESHOLD OF DISCOMFORT IN SECONDS (READING)	MEAN VARIATION
									Based on 3.5	Based on result sought (drop in ratio)		
			cm.	*sec.*	*sec.*				*per cent*	*per cent*	*sec.*	*per cent*
Amber...	0.003344	9 a.m.	61	142	38	3.74	3.50	19.7	0.20	1.02	47.7	0.90
		12 m.	61	135	45	3.00	2.81					
Red.....	0.003344	9 a.m.	61	140	40	3.50	3.50	24.5	0.43	1.74	39.5	1.60
		12 m.	61	130.6	49.4	2.64	2.64					
Blue.....	0.003344	9 a.m.	61	141	39	3.62	3.50	41.0	0.70	1.70	19.3	2.20
		12 m.	61	122.5	57.5	2.13	2.06					
Green....	0.003344	9 a.m.	61	142.5	37.5	3.80	3.50	53.0	1.00	1.88	14.3	3.00
		12 m.	61	115	65	1.78	1.64					

operated at specification is about that of a black body at a temperature of 2360 K. Measurements were made at a number of the principal points in the spectrum located by comparison with the spectrum lines of a helium tube. The range of transmission of the lamps was also determined. A Hilger spectrometer provided with a calibrated scale was used for this purpose. The range for the red lamp to combine the features of the average visibility curve with the energy curve. The spacings of the web based on the visibility curve at 50 m.c. are, it is scarcely necessary to point out, not strictly applicable to our data which are for lights of lower intensity. For our data the spacing should be, for

[7] Benford, F. A., Plotting of Spectrophotometric Data. *Trans. I. E. S.*, 1923, *18*, pp. 67–92.

example, relatively wider in the region of the blue and blue-green.

The results showing a comparison of the power to sustain clear seeing before and after three hours of reading under the different illuminations are given in table 2 and figure 16. The values given in table 2 are averaged in each case from the results of a number of 3-hour tests. In order to show the reproducibility of the results obtained and to determine whether the variations produced by the change in the experimental conditions are safely in excess of the variations in the test itself, the mean variations from the average result have been computed in each case. The value of these in per cent is given in columns 10 and 11, table 2. These values have been estimated in two ways. In column 11 it is based on the result sought, namely, the mean value of the drop in ratio of time seen clear to time seen blurred. Computed in this way the results indicate whether or not each individual determination has been made with an acceptable degree of precision as compared with other work of its class. In column 10 it is based on 3.5, the value of the ratio, time clear to time blurred, which has been chosen empirically as the standard of performance of the eye in the 3-minute record before work. Computed in this way the results appear in a form from which it can be determined whether or not the work has been done with a degree of precision which is acceptable for the comparative work which is the special purpose of these experiments. That is, to be acceptable in this regard, the variations of the drop in ratio caused by changing the conditions to be

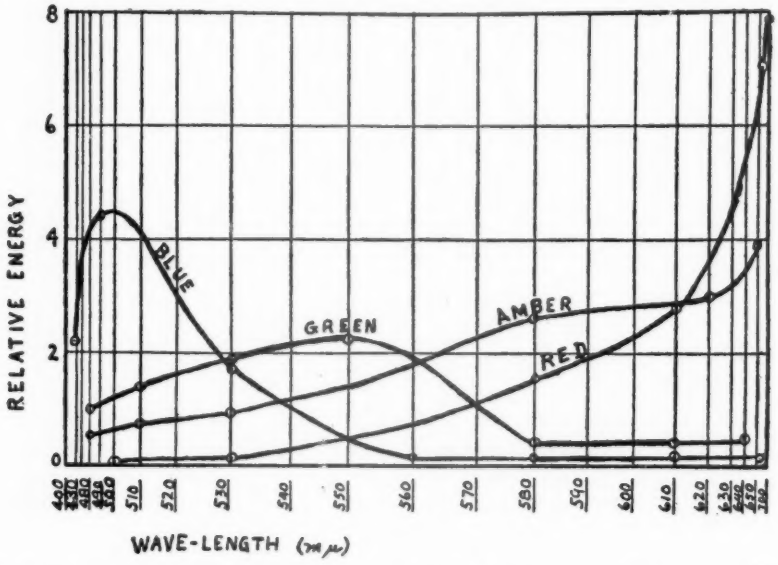

FIG. 16. SHOWING THE RELATIVE ENERGIES OF THE WAVE-LENGTHS REFLECTED FROM THE READING PAGE, PLOTTED ON BENFORD'S WEB

tested must in each case be safely in excess of the mean variation. To make this comparison convenient, the drop in ratio and the mean variation have both been estimated in per cent on the same base, 3.5. In figure 10 the ratio time clear to time blurred is plotted against hours of reading. For convenience of plotting the ratio before the period of reading is corrected to 3.5 in all cases and the appropriate factor applied to the ratio obtained after the period of reading.

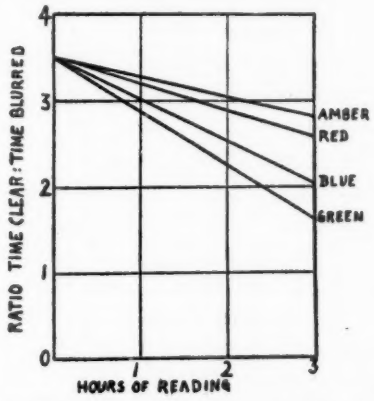

FIG. 17. SHOWING THE TENDENCY OF THE DIFFERENT COLORED ILLUMINATIONS TO CAUSE EYE FATIGUE

From these results it is seen that in reading the eye fatigues the least under the amber light. For the other lights the order from least to greatest is red, blue and green. These results seem to accord well with the other aspects of acuity tested under the spectrum lights. Whatever the function tested: acuity, speed, power to sustain, fatigue or discomfort, the best results have been obtained for the wave-lengths in the middle of the spectrum in the region of the yellow. Also the order of merit for all the other colors with the exception of green is the same for the five types of test that have been used. Green seems to change its position in the series in some relation to the time the eye is required to sustain its performance. That is, for speed of discrimination and acuity green gives better results than red or blue. For power to sustain acuity, however, it gives a worse result than red, and for fatigue, worse than either red or blue. In Part I we have offered tentative suggestions as to why the eye sustains its power of clear seeing poorly under green light.

SUMMARY AND CONCLUSIONS

(1) Tests for acuity, speed of discrimination, power to sustain clear seeing, and loss of visual efficiency, have been employed to show the effect of color and composition of light on the visibility of objects in selected relations of object to background and on functions which are of importance to the working eye. Two intensities of spectrum light were used. Wave-lengths were selected at seven representative points in the spectrum,—in the red, orange (orange-red), yellow, yellow-green, green, blue-green, and blue; and all were made photometrically equal at the test-object. Of these the highest acuity was found for the yellow and the lowest for the blue. Ranked as to acuity from greatest to least the following order was obtained for the lower of the two intensities employed, —yellow, yellow-green, orange, green, red, blue-green and blue. The spectrum blue and blue-green could not be obtained at the higher intensity. At this intensity the ranking of the other five colors remained the same as for

the lower intensity. The effect of difference of wave-length on acuity was greater at the higher than at the lower of the two intensities. This was doubtless due to the relative saturations of the colors at the two intensities. That is, the difference in saturation between the colors was greater at the higher intensity.

At the higher intensity the acuity was determined also for a daylight glass transmitting the light of a Mazda type C lamp operated at 108 volts; and for the light of this lamp unfiltered. The acuity in both cases was higher than for the yellow of the spectrum, and higher for the daylight glass than for the unfiltered light of the Mazda lamp. The comparison was not made at the lower intensity. The light transmitted by the daylight glass was a mixed light but it had a considerable advantage for ease of discrimination over the yellow with regard to both hue and saturation. That is, the test surface illuminated by it appeared as a clear white light on which the test character stood out with great clearness and distinctness. The uncorrected light of the Mazda lamp also suffered the disadvantage of being a mixed light but it had an advantage over the yellow in the saturation of the color component. Had the intensities been higher and the saturation of the yellow correspondingly reduced, the results of the comparison might have been very different. As it was, however, the advantage of the yellow in homogeneity as to wave-length was more than overcome by its disadvantage in hue and saturation. Also, the amount of color introduced into the light of the Mazda lamp by operating it at 90 volts gave it a lower acuity than the yellow, approximately equal to the yellow-green, when the comparison was made at the lower of the two intensities.

(2) The ranking as to speed of discrimination was the same throughout as the ranking for acuity for all of the lights employed,—the spectrum lights, the daylight glass, and the Mazda lamp. In general, however, the effect of change of composition on the speed of discrimination is very much greater than on acuity. For example, the acuity for the spectrum yellow was, for the lower of the two intensities of light employed, 2.2 times the acuity for the blue; while the speed of discrimination for the yellow was 9.7 times that of the blue. The acuity was determined with an exposure of 1 second. If the time of exposure had been longer than 1 sec. the difference between the results for the two tests would have been greater still.

(3) The ranking as to power to sustain acuity was also the same throughout as the ranking for acuity for all the lights employed with the exception of red and green. A higher acuity and speed of discrimination were obtained for green than for red; but in case of the power to sustain acuity the reverse was true. The eye sustains its acuity better under red light. With reference to power to sustain the most striking feature is the very great difference in effect for the different wave-lengths. A comparison of the results given in this paper with those obtained in former studies indicates that power to sustain as a test shows a relatively much greater

sensitivity than acuity and speed for picking up differences in the effect of wave-length than for picking up differences in the effect of intensity.

(4) Relation to background is too often ignored in rating the visibility of objects. It, as well as size, is an important factor. Black has a higher visibility on white than on any of the colored backgrounds employed. On the colored backgrounds the order of ranking as to visibility is from greatest to least: yellow, yellow-green, orange, green, red, blue-green and blue.

(5) In evaluating the effect of factors on the visibility of objects, the effect on the retina's power to discriminate detail in the image must be taken into account as well as the effect on the power of the refracting system to form clear images. Blue light, for example, because of the influence of diffraction on the resolving power of the refracting system, should form clearer images on the retina than yellow light, yet a background of yellow gives a higher visibility of detail to black objects than blue of equal brightness and saturation. Also white light, because of chromatic aberration, should give less clear image than any colored light of spectrum purity. Yet a white background gives higher visibility of detail for black objects than any of the colors of equal photometric value.

(6) In ratings of visibility it is important also to consider the influence of the time factor. Green, for example, which as a background gives a higher visibility of detail for black objects than red of equal brightness and saturation for short exposures to the eye, gives a lower visibility for more prolonged exposures. That is, the eye can not sustain its power for discriminating detail in black objects on a green as well as on a red background.

It is interesting to note that the retina has developed its greatest power to give the achromatic response to the wave-lengths in the mid region of the spectrum, that part of the spectrum which represents the dominant hue of sunlight, but over and above this, *i.e.*, when all are equalized in power to give the achromatic response, these wave-lengths still have a very great advantage for the three most important aspects of clear seeing,—acuity, speed of discrimination and power to sustain acuity. And when equalized both in luminosity or power to give the achromatic response, and in saturation, there is still a distinct advantage for the wave-lengths in this part of the spectrum. As might be expected the coincidence here is somewhat rough. The maximum achromatic sensitivity is shifted from the yellow towards the yellow-green while yellow stands at the head of the list in all the tests that have as yet been applied,—acuity, power to sustain acuity, speed and the tendency to produce ocular fatigue and discomfort. Yellow-green and green stand comparatively high in the first three tests, but have not ranked so well in the tests for fatigue and discomfort. Even the three-minute tests of power to sustain acuity give evidence of the inability of the retina to hold its resolving power under the action of these wave-lengths. The indications from this and previous work are that the ruddy yellows up to and well into the

orange rank comparatively high all around; while the deep reds, the blue-greens, and the blues are obviously not meant to serve as backgrounds upon which achromatic details must be discriminated with precision, ease, and speed for long periods of time.

It is also interesting to note that while the eye has developed color reactions it has also developed rather elaborate means of getting rid of these reactions for the greater part of its seeing. (a) The color reactions have been developed in complementary pairs. (b) The maximum saturation of color comes at intensities far below those which give an adequate working illumination. The maximum saturation of the spectrum colors comes at less than one-tenth of a foot-candle. Any increase of intensity beyond this level results in a loss of saturation. Thus with reference to the intensity scale alone nature has provided that the eye shall not work under light of maximum color. And (c) the adaptation to the chromatic component of the excitation is rapid,—much more rapid than to the achromatic component. That is, when acted on by colored light the eye rapidly loses its power to give the color reaction. Obviously the eye was not intended to see and to work under what we ordinarily call colored light.

Color may be considered as a mild physiological drug to be used with intelligence and discretion and with taste,—not in poisonous doses. In the hospitals and clinics we find eyes in great numbers for which the poisonous dose of color is extremely low, far below the amount present in Mazda light. The color temperature needed for these eyes, indeed for all eyes, is between 5000°–6000° K instead of 2000°–3000°.

Manuscript received July 8, 1930

What May the College Woman Expect by Way of a Job?[1]

By Roy N. Anderson, *Teachers College of Columbia University*

Mr. Anderson's study was reported at the Detroit meeting of the American College Personnel Association, the proceedings of which appeared in the June Personnel Journal.

Data regarding the placement of 891 college women have been gathered from seven placement bureaus located in cities from coast to coast. These women took their training in 225 colleges, representing the entire country.

They entered twenty-eight different vocations. The median salary, as well as the first and third quartiles, for certain occupations, and various age levels are presented and comparisons are made with the University of Michigan study, *Earnings of Women in Business and the Professions.* An attempt was made to find out whether or not business school training in addition to the regular four-year college course was an advantage. In clerical occupations women with this additional business school training received on the average $100 a year more than those without it.

AFTER four years of mental stimulation in the class-rooms and libraries of our institutions of higher learning; after four years of social life on the campus; after four years of specialized study and contact with keen-minded individuals—what may a college woman expect by way of a job? For an answer to this question we can only investigate the experience of a large number of women who have attended college and are gainfully employed. Opportunity to study such a group of individuals from various cities was afforded the writer from the records of placement agencies which specialize in securing jobs for college graduates. Facts were secured regarding the type of position, salary, age, amount of education and college attended. The cases number 891, furnished by these bureaus: Bureau of Vocational Service, Los Angeles, 50 cases; Women's Occupational Bureau, Minneapolis, 78; Collegiate Bureau of Occupations, Denver, 80; Women's Educational and Industrial Union, Boston, 127; Women's Employment Service, Central Y. W. C. A., Pittsburgh, 107; Central Branch Employment Bureau, Y. W. C. A., New York City, 136; Collegiate Bureau of Occupations, Chicago, 313. In as much as these placement bureaus are located in cities from coast to coast

[1] The writer is indebted to the National Federation of Bureaus of Occupations for furnishing the data for this investigation.

the results might be considered as a fair sampling of the country as a whole. All positions here recorded had been held for three months or longer and thus can be considered as permanent placements. Temporary placements for one or two months or for the summer have been disregarded. The appointments to these positions occurred between August 1929 and March 1930.

The women whose records were studied come from all parts of the United States and Canada. The 225 educational institutions where they pursued their collegiate work are scattered over the entire country. The majority (568 or 64 per cent) completed four years in college, while 41 or 4 per cent had the additional advantage of one year graduate work. Ninety-five or 11 per cent attended college three years and 179 or 20 per cent two years. Three attended one year and the remaining five did not state the number of years spent in college.

WHAT IS THEIR MARITAL STATUS?

This question generally comes to the fore whenever facts about women gainfully employed are discussed. It is a known fact that approximately 80 out of 100 women marry and follow the vocation of homemaker. Some of these, however, may prefer an additional vocation outside of the home. Even if a girl does marry she is likely to engage in an occupation before marriage. Among the college women the percentage who marry is somewhat lower. It has been variously reported as 40 to 60 per cent. But in accepting these figures we must consider when they were gathered, because the most recent graduates will probably constitute the greatest number and their opportunities for marriage are not as great as those who have been out of college a number of years.[2] In this group, however, we find only 93 or 10 per cent who are married, though an additional 37 or 4 per cent are widowed or divorced. This small figure may be explained partly by the fact that these women were only recently graduated from college and they have not yet had the opportunity or desire to marry. Seven hundred and fifty-four or 85 per cent are single and the remaining seven or one per cent give no information regarding their marital status. These results are to be expected when we examine the age distribution in table 1. The median age is only 24, which means that 50 per cent of the women are between 18 and 24 years of age.

WHAT JOBS DO COLLEGE WOMEN ENTER?

If one scans the long list of occupations listed in the United States Census, he will find that women have invaded a majority of these occupations.

[2] "Study of the marriage ratio of all the Oberlin Alumnae shows that ultimately 60 per cent of them marry. This ratio has been constant since 1900. The same proportion of the alumnae of Vassar, Wellesley and Smith marry."—*Vocational stability of Alumni*, L.D. Hartson, PERSONNEL JOURNAL, 1928, vol. VII, no. 3. "In classes from 1893 to 1929, 46.9 per cent were married. In classes which have been out of college five years or more, 1893–1924 inclusive, 54.8 per cent have married, and ten years out of college, 1893–1919 inclusive, 56 percent have married." Page 203—*Register of the Associate Alumnae of Barnard College*, Bulletin no. 34, May, 1930.

In fact it is rather difficult to find an occupation in which women are not represented. But the Census covers the entire gamut of occupations and no differentiation is made in regard to the positions held and the age or educational attainments of the individual. In as much as the women in our group were college students, we should expect to find them gravitating toward a restricted group of occupations. Their distribution is shown in table 2.

TABLE 1

Marital status and age

	NUMBER OF CASES	PER CENT	1ST QUARTILE	MEDIAN	3RD QUARTILE	RANGE
Single	754	85	22	24	27	18–53
Married	93	10	24	27	29	20–49
Widowed, divorced or separated	37	4	28	34	40	22–52
Not stated	7	1				
Total	891	100	22	24	28	18–53

TABLE 2

Types of positions held

POSITION	NUMBER	PER CENT	POSITION	NUMBER	PER CENT
Clerical group:			*Educational group:*		
Stenographer	193	21	Teacher	27	3
Secretary	145	16	Education Administration	9	1
Clerical	114	13	Physical education	5	½
Typist	29	3		41	4½
Bookkeeper	21	2			
Telephone operator	9	1	*Miscellaneous:*		
	511	56	Saleswomen	25	3
			Laboratory technician	16	2
Home Economics group:			Statistician	15	2
Manager tea room	50	6	Demonstrator	17	2
Dietitian	31	3	Librarian	15	2
Matron	17	2	Editorial and Journalism	8	¾
Companion	5	½	Publicity and Advertising	7	¾
Nursing	5	½	Personnel	6	¾
	108	12	Receptionist	6	¾
			Cashier	5	½
Social worker	78	9	Executive secretary	9	1
			Miscellaneous Department store	15	2
			Unclassified	9	1
				153	18½
Total				891	100

It is evident from the above table that the range of occupations upon which these college women have entered is very restricted. More than half (511 or 56 per cent) have followed the beaten path and aligned themselves with clerical occupations. The next largest group might be classified as a home economics group with 108 or 12 per cent engaged in five different types of work. Seventy-eight, or nine per cent have cast their lot with social welfare workers. Only 41 or 5 per cent went into the educational field. It is a well known fact that many college women enter this field but the reason so few in this study entered that vocation is due to the fact that these placement bureaus are primarily interested in occupations other than education. Such jobs are generally secured through Teachers' Employment Agencies. The remaining 153 or 18 per cent are engaged in thirteen other vocational activities. This range of 28 occupations is very meager as compared with the 538 different occupations or occupational groups which number women among their ranks in the 1920 Census. What are the reasons for this? It is generally assumed that all walks of life are open to college graduates, but we must add that all are not acceptable. The jobs held by practically fifty per cent of the women listed in the Census could be ruled out immediately; that is, jobs in manufacturing and mechanical industries and in domestic and personal service would not be considered by college graduates. Another reason for the small range is the fact that the majority of these women have just left college and have probably taken the first job that came their way. As they mature they may branch out into more diversified vocational activities.

WHAT SALARIES DO COLLEGE WOMEN EARN?

The question of salary is beset with so many complexities that it is difficult to draw specific conclusions. A few of the factors that enter into the situation are: age, sex, experience, education, size of community, responsibility of the position regardless of title, type of employing firm, to say nothing of the qualifications of the individual.

Table 3 shows the salaries of the women in several occupations regardless of age or experience. In order that they might be compared with the thorough study of the *Earnings of Women in Business and the Professions*,[3] by Elliott and Manson, the median salaries were computed. The number of cases in each group, the quartile range and the median yearly salary are given. Salaries earned by women in certain positions were not tabulated since some of the groups were too small. In certain other positions the women received room and board in addition to their pay check, and since the value of these emoluments could not be estimated, the figures have not been included in the table.

The college girl may ask the question, In what occupational fields will

[3] Margaret Elliott and Grace Manson. *Earnings of Women in Business and the Professions*. Michigan Business Studies, vol. III, no. 1, September, 1930, University of Michigan, Ann Arbor.

I receive the most pay at the beginning? The answer from this study would be teacher, social worker and secretary in the order named. The lowest beginning wage was received by the saleswoman. But the number of cases in the teacher and saleswoman groups is too small to have much reliability. We must keep in mind, however, that the salaries reported are those received when they took the job and may thus be considered as the minimum. In order to find out if the same situation holds true after several years' experience, we might compare the salaries of the college group with those of the Business and Professional Women who are holding similar positions. The effect of specialization is evidenced by the fact that statisticians and laboratory technicians head the list with social workers ranking third. It is also interesting to note that saleswomen in this group again bring up the rear. In comparing these two groups we must keep in mind that the median age for the Business and Professional Women's group is 38 with approximately 14 years experience. While the median age for this college group is only 24 years and the number of years of experience, though not available, would probably be five years or less.

If we hazard a glance into the future by comparing those in Group I with little experience and those in Group II with about 14 additional years of experience, it would seem that the chances for increasing one's earnings in some of these occupations is rather limited. But we might comfort ourselves with the thought that as the years go on the college group would surpass the median earnings of the Business and Professional Women's group and approach the upper quartile. If we take into consideration those individuals in Group II having

TABLE 3

Salaries earned in various types of work

	GROUP I—COLLEGE WOMEN				GROUP II—BUSINESS AND PROFESSIONAL WOMEN			
	Number	1st quartile	Median	3rd quartile	Number	1st quartile	Median	3rd quartile
Stenographer	193	$1,155	$1,314	$1,512	1,029	$1,026	$1,295	$1,567
Secretary	142	1,240	1,400	1,600	539	1,310	1,582	1,887
Clerical	112	920	1,030	1,225	352	1,064	1,264	1,569
Typist	29	915	1,100	1,350	25	905	1,150	1,325
Bookkeeper	19	1,306	1,355	1,600	752	1,046	1,317	1,595
Teacher*	21	1,520	1,650	2,020				
Saleswoman	24	936	980	1,100	279	730	932	1,100
Social worker	67	1,250	1,508	1,576	39	1,388	1,650	1,882
Assistant librarian	15	943	1,106	1,225	29	862	1,275	1,938
Statistician	15	1,025	1,225	1,300	14	1,575	2,100	2,275
Laboratory technician	14	1,216	1,312	1,523	35	1,519	1,842	2,142

* The majority were teachers in private schools and no comparable figures were given in the Business and Professional Women's study.

had five years of experience or less, who are more comparable to those in Group I, we find that the median salary they received was only $1133.[4] Four of the occupational groups in this study fall below this figure. They are: clerical, typist, saleswoman, and assistant librarian. We may conclude that this group as a whole receives higher wages at the start than those reported in the study of the Business and Professional Women's groups who have been five years or less on the job.

The material presented in this table shows that the median earnings for Group I are higher than for Group II for all ages except those over 35 years of age, but the number of cases is too small in these groups and also in the group ranging from 15–19 years of age to justify emphatic conclusions. Those between 20–24 years of age earn $145 more a year and the quartile range is smaller. But this comparison is made regardless of the educational attainments of the Business and Professional Women's group. Let us compare those in Group I with those who have the bachelor's degree. These figures are presented in the last column of table 4. Here we find that the college women for each age group in this study receive lower salaries than do the college graduates in the Business and Professional Women's group. Again, the difference is probably due to the greater amount of experience which the women of the latter group have had.

TABLE 4

Salaries in relation to age

AGE	GROUP I—COLLEGE WOMEN				GROUP II—BUSINESS AND PROFESSIONAL WOMEN*				
	Number	1st quartile	Median	3rd quartile	Number	1st quartile	Median	3rd quartile	Median†
15–19	11	$976	$1,067	$1,150	87	$675	$841	$1,075	
20–24	347	1,027	1,250	1,328	1,427	864	1,105	1,347	1,377
25–29	204	1,177	1,368	1,535	2,086	1,098	1,341	1,628	1,544
30–34	47	1,350	1,564	1,885	2,153	1,271	1,538	1,947	1,792
35–39	24	1,280	1,523	1,834	2,310	1,295	1,684	1,991	1,892
40–44	10	1,100	1,300	1,500	1,972	1,378	1,791	2,276	2,031
45–49	7	1,300	1,500	1,800	1,569	1,359	1,819	2,338	1,956

* Op. cit., page 28, table XII (entire group 14,073).

† Op. cit., page 73, table XXVIII (college graduates only).

The relation between age and earnings of the individuals in this study is compared in table 4 with the age and earnings of the Business and Professional Women's groups. Generally speaking, earnings increase with age, at least up to a certain point. This is clearly shown to be true in the case of the Business and Professional Women's group.

[4] Op. cit., page 26.

IS SUPPLEMENTARY TRAINING IN A "BUSINESS COLLEGE" AN ADVANTAGE TO COLLEGE WOMEN?

A number of the college graduates in this investigation had attended "business college" in addition to their regular four years. What advantage comes from this additional training? No doubt many arguments can be assembled pro and con. The data in this study only permit us to find out whether those who have had business college training in addition to four years of college are earning salaries higher than those who have had only four years of academic work. The average earnings of 142 women who reported business training in addition to graduation from college was $1311 ±$20 with a standard deviation of $336 ±$14, while the average earnings of the 167 who did not have this additional training was $1212 ±$17 with a standard deviation of $332 ± $12. The earnings of the college women with this training are higher; but is this difference significant? In order to ascertain whether or not this difference of $99 is significant we must compute the probable error of the difference. (P. E. of difference = $26). Such a difference to be significant should be four or five times its probable error. Ninety-nine dollars is practically four times 26 hence we can be almost certain that the difference is significant and that it does pay financially for college students to secure business school training in addition to their four year college course. True, this advantage may hold only for individuals who are just entering upon their first job. This observation is made by the investigators of the Business and Professional Women,[5] who believe that this additional amount of salary is soon lost when the question of length of experience enters into the situation. It is conceivable that certain types of jobs may be included in their study for which business school training is unnecessary but from the occupations in which this group of college women are engaged we have the following: secretary, stenographer, clerical, telephone operator and clerk, bookkeeper and accountant. One will agree that business school training would be an advantage in clerical occupations, and it is substantiated by the additional salary received by those having this training.

CONCLUSIONS

The facts presented in this study can probably be considered a fair cross section of conditions which college women meet when they enter occupational life. The data have been gathered from agencies which specialize in the placement of college women located in cities from coast to coast. The academic training of the group is also very widely distributed. More than half had completed four years of college work. Three-fourths of them are under 29 years of age and 85 per cent are single. In short, we have a picture of the occupational activities of college women soon after graduation and during the interim between graduation and marriage.

The study reveals that the occupations entered were confined primarily

[5] Op. cit., page 90.

to the clerical group. It is a well-known fact that a large majority of college women enter the educational field. The reason for such a limited number in this study is probably due to the fact that educational positions are secured directly through the school or agencies that specialize in educational positions exclusively.

In general, we might conclude that the college women are not in very great numbers encroaching upon the occupational domains of men, but that they are more or less following the traditional occupations for women. It was found that the occupations in which these women engage constitute only a small percentage of those fields in which the Census shows women to be gainfully employed. From the fact that 50 per cent of these women are less than 25 years of age we can safely say that college graduates are not very discriminating in regard to the types of jobs they enter. This is probably their first occupational undertaking and they are following the traditional occupational highway that so many other women are following rather than exploring some of the interesting byways, but with age and experience this condition may change.

The beginning salaries which these college women received are considerably below the salaries received by the Business and Professional women who have had a college education, but this is accounted for by the fact that the latter have had experience. In comparing the salaries with those of the 14,073 Business and Professional women of the same age we find that the salaries are higher for the group in this study. For those between the ages of 20 and 24 it was appreciably so.

There seems to be evidence that training in a business school in addition to the regular collegiate work is a financial asset, at least, in the clerical occupations. Those who had taken this additional training received on the average $100 more per year than those without this training. While this might not be the fundamental cause of the condition, the difference was significant, and if other subtle factors are at work, it will be revealed only through individual case studies.

Such are the conclusions drawn from the material available in this study and these are the conditions which the college woman graduate might expect to find. The material should be of value to vocational counselors and college placement officers in informing college women what they may expect on leaving the academic halls for the business world. Similar studies can be made from the records of other college placement bureaus and compared with the facts found in this investigation.

Manuscript received April 2, 1931

News Notes

THE MOOSEHEART LABORATORY FOR CHILD RESEARCH

The Mooseheart Laboratory for Child Research, established at Mooseheart, Illinois, in September, 1930, has now formulated its plans and purposes.

In the conference of experts in child development held in May, 1929 as a preliminary step in the establishment of the laboratory, emphasis was placed on the recommendation that the laboratory was to have two general functions, one of service to the institution and one of research or advancement of knowledge in the whole field of child development. As expressed by one of the representatives of the Board of Governors, the aim is to "establish an institution of a national character, performing a national service, and having very wide national connection." Another statement was, "we have not established this school just to take care of orphan children of the Moose but this school has been established to try to make a contribution to the child life of America, including school, home, and community life."

The Board of Governors whose president is Hon. James J. Davis, United States Senator from Pennsylvania and the founder of Mooseheart, took the first step in establishing the Laboratory by appointing Dr. Martin L. Reymert formerly head of the department of psychology of Wittenberg College, as Director.

As soon as arrangements can be completed the Laboratory will be housed in an independent building, part of which is being remodeled for occupancy by July 1. An appropriation for the coming year will make possible an enlargement of the staff and provisions for a library and for laboratory equipment.

The Child City of Mooseheart with approximately 1350 supposedly mentally and physically normal children of all ages offers unique research possibilities which can hardly be duplicated anywhere else. The outstanding advantage is the possibility of carrying on over a period of 8 to 18 years and relating to one another, studies in the various fields of child development on the same group of children who are under constant 24-hour control. In planning the research program the aim is to make the most of this favorable situation. Beginning in the "Baby Village," longitudinal studies will be made which can be continued up to the time of graduation from high school.

A comprehensive school survey with the aim of determining the standing of the Mooseheart child compared to national norms was begun in October and is now nearing completion. The measures included are tests of general intelligence, tests of mechanical aptitude and ability, personality tests, sensory tests, and achievement in school subjects. These will cover the whole range of children from the preschool child to the senior in high school. The results should be in monograph form soon.

All files of permanent records and other information are being studied with a view toward revision and reorganization so as to make them readily available and more serviceable both to the Laboratory and to other individuals concerned with the care and training of the children.

A follow-up study of all Mooseheart graduates by questionnaire shows, in general, a normal standing of both boys and girls in regard to their present positions, salary, etc. An unexpectedly large percentage of the graduates have continued their schooling in college or normal school. This follow-up work will be continued and extended, to make it directly serviceable to the graduates and to gather more definite and more reliable data about them.

A general survey of Mooseheart housemothers, including a job-analysis, is nearing completion. This study may stimulate the eventual establishment at Mooseheart of a national school for matrons and proctors with a theoretical and practical course of study. With its natural laboratory Mooseheart seems ideally adapted for such a school.

A thoroughgoing study of problem children, such as are found in a normal community, has been under way since October. The continuance of this study will be a main consideration in the work of the Laboratory and will be participated in by a clinical psychologist, a psychiatrist, a social worker and possibly others such as a physician and a nutrition expert. Some of this work will be carried out in cooperation with the Institute for Juvenile Research in Chicago.

A related project is the development of two mental hygiene cottages or "Social Sanitaria" as they have been called. The experiment will be carried out jointly by the administration and laboratory. A selected graduate student will be put in charge of each cottage to act as "big brother" or "sister." Various methods and techniques for facilitating the rehabilitation and reeducation of a problem child under such conditions are being worked out, some general ideas underlying this experiment being proper education, beneficial environmental influence, and influence of associates with stable personalities, instead of traditional measures of punishment. Ultimately this study should result in some principles regarding factors to be considered in cottage placement.

Since musical education plays a very important part in the life of Mooseheart children, each one being offered the opportunity to select from a considerable variety of musical instruction, both vocal and instrumental, a detailed study of this field is in progress. The Seashore tests and the Kwalwasser-Dykema are being used together with other measures to find the various relationships in regard to native and acquired musical ability, through repeated measurements over a period of years.

An intensive personnel study with a view to proper classification in the high school and proper placement in vocational work, as well as cottage placement, has been undertaken with all pupils now in the 8th grade. This involves provision for retesting and reclassification semi-annually until graduation, and should offer important data in regard to the various factors leading to success in academic and vocational high school training. With continuous revision and intensification it will constitute the foundation for the whole procedure of guidance in development, and of organized child care and training.

A study of the effects of vitamins on dental conditions has been carried on at Mooseheart through a grant from the Otho Sprague foundation and has been under the direction of Dr. Milton Hanke. It is hoped that this may be continued over an extended period so as to determine long time effects.

Studies in nutrition will be started during the summer in cooperation with Dr. A. J. Carlson, physiologist, of the University of Chicago. In these studies use will be made of the excellent X-Ray equipment in the hospital. Nutrition studies of various kinds will be an important phase of the long time research program.

A study of the effects of motion pictures on attitudes of children with particular reference to the persistence and cumulative nature of these effects is being undertaken in coöperation with Dr. L. L. Thurstone of the University of Chicago. This study, as in the case of the other studies, it is hoped, will be the seed for a larger research program and in this case will grow into an extensive research on children's attitudes, their development, fluctuation, etc.

In general, the plan is to motivate the carrying on of longitudinal studies on the growing child over a period of ten years or more, beginning with the infants and preschool children in the "baby village" and measuring and studying them until they graduate. Such research in the course of time should afford an opportunity for rescrutinizing the accumulated data and theories in almost all lines of child development.

At the suggestion of the members of the 1929 conference and with the expressed wish of the Board of Governors an Advisory Council is being established as a means of

keeping in touch with other research centers and of coördinating research in the various fields related to child development. Such a Council should make it possible to keep the emphasis in each field on the particular problems which require research and which are of interest, and also to keep the whole program balanced and not permit it to gravitate toward any special field. In connection with the annual meeting of this Council at Mooseheart there will be held a conference on child development, care, and training, to which interested institutions and individuals will be invited.

Close connections are rapidly being established with universities and other research centers interested in the development of the normal child. Fellowships, perhaps mainly in the form of maintenance and other encouragements, will be offered to faculty members and graduate students from such research centers. During this summer a number of graduate students and candidates for the doctorate are working under the auspices of the Laboratory.

SAFETY IN MINES

The beneficial results of a campaign for safety in the mines are described in the annual report of the Joseph A. Holmes Safety Association which has been transmitted to the Personnel Research Federation by its representative in that association, Mr. Frank Morrison of the American Federation of Labor. During the past year medals were awarded to fifteen men for heroic acts at times of grave emergency, and certificates were issued to eighteen companies for highly meritorious safety records. Many new councils and chapters of the Safety Association have been established and old chapters vitalized. At present there are seventy-three chapters active in the mining, metallurgical, petroleum and phosphate industries. Through an appropriation by Congress, the sum of $7850 is available for the furtherance of this work beginning July 1, 1931.

RUSSELL SAGE FOUNDATION CONDUCTS SURVEY OF UNEMPLOYMENT IN NEW HAVEN

The Russell Sage Foundation is now conducting a local survey of unemployment in New Haven which is designed to ascertain the present amount and character of unemployment in that city, and at the same time to serve as a field experiment in a larger study of methods of unemployment enumeration. The study is being carried on under the direction of Margaret H. Hogg and Ralph G. Hurlin of the Foundation's Department of Statistics. New Haven was selected as the location for this field study because of the active interest and coöperation of the Yale Institute of Human Relations and the New Haven Citizen's Committee on Employment. The headquarters of the study are at the Yale Institute. A force of sixteen field workers is employed in canvassing a true random sample of about 2,000 families. Investigation was begun on May 18. It is expected that less than four weeks will be required for the careful interviewing of the selected families, and tabulation of the more important items of information will be made immediately upon completion of the field work.

The numerical results of the study will be made available promptly to those in charge of local unemployment and relief measures. The more detailed study of the results will become the basis for recommendations concerning accurate and practical methods of measuring unemployment periodically in any city. These recommendations will cover such topics, of major importance in any unemployment survey, as the following:

1. How much and what information shall be sought?
2. How shall questions be formulated?
3. What sort of investigators shall be used?
4. In what form and detail shall answers be calculated?
5. How shall the rate of unemployment be calculated?
6. If only a portion of the population is canvassed, how shall the portion be selected?

With respect to most of these points, there is wide range of choice, and the decisions made have important effect on results obtained. Frequently results can be interpreted only with great uncertainty because of the methods adopted, and when

two surveys use entirely sound but different methods, the results cannot be compared directly, and sometimes not with safety at all. Reliance is being placed in the New Haven study on a small sample scientifically selected, in the belief that greater efficiency will be obtained by spending more of available funds for carefully chosen investigators, and more detail of information than would be possible if the complete population or a large sample were investigated.

As a result of the complete study, a report evaluating methods of local surveys of unemployment is planned, which will discuss alternative methods and suggest standard schedules and tabulation forms for inquiries of different degrees of intensity. This presentation of methods, it is hoped, will prove of considerable value in future surveys. It should assist in improving the quality of results, and should result in saving much time of investigators in preparing for field work and determining the manner of analysis and presentation of data obtained. It should also result in greatly increasing the comparability of the findings of unemployment surveys made in different places.

An extended schedule has been used in obtaining information concerning families in the New Haven study, in order to test the practicability of many questions which might be desired in such an inquiry. As one of the conditions of the experiment, the staff of field investigators has been selected from persons living in New Haven.

OCCUPATIONAL SURVEY OF WOMEN GRADUATES

According to a recent occupational survey of women graduates of the School of Commerce and Administration, University of Chicago, made by Ann Brewington, the three most common types of positions held are secretarial, teaching, and managerial. Secretarial work is most common as a first position, while teaching is the most common type of work in present positions. Those who are quite young at graduation tend to do secretarial work at the beginning and to leave it as they mature in age and experience. Not until a woman has some experience is she likely to hold a managerial or research position involving much responsibility.

A majority of the women work in Chicago at all times, but the tendency is to move away from the city after the first position, perhaps because secretarial positions are numerous in Chicago, while teaching and other types of work are relatively more numerous elsewhere.

Earnings are related to amount of experience, amount of education, type of work, and age. There is no apparent relationship between length of service with a firm and increase in salary. Earnings on first positions are lower than those on present positions. The increase of approximately $500 at the lower end of the salary range of teachers and secretaries on first and present positions indicates that (1) beginning salaries are much higher at present than formerly, and that (2) those who received the lower salaries have either ceased earning or have received substantial increases.

No statements can be made regarding changes in type of work, except that such changes are usually accompanied by increase in salary.

Unemployment is negligible, since in a majority of instances no time was lost between positions, and a high percentage of the intervals of unemployment which did occur is explained as the period between school sessions, or as time allotted to study.

TEACHERS COLLEGE

Teachers College of Columbia University announces that Dr. Esther Lloyd-Jones, author of *Student Personnel Work at Northwestern University* (Harper's) has been appointed Assistant Professor in educational and social guidance of women for the year 1931–32. Dr. Lloyd-Jones graduated from Northwestern University, took her graduate work in Teachers College, and served for two years as assistant director of the Bureau of Personnel in charge of personnel for women in her alma mater. She completed her work for the degree of Doctor of Philosophy at Teachers College in 1929, and was part time lecturer there in the guidance field in 1928–30. At present she is associated with the central committee on personnel of the National Council of Education, in charge of studies relating to personal development of college students.

The catalogue of Teachers College for 1931–32 announces that the department of educational and social guidance of women has added courses in field work for those who are preparing for work as deans of women in colleges and teacher training institutions and as advisers of girls in high schools. The courses as listed offer opportunity for actual experience in some phase of counseling or administration.

ANTIOCH COLLEGE

Henry S. Dennison of the Dennison Manufacturing Company of Framingham, Massachusetts, was co-speaker with Arthur E. Morgan, president of Antioch, at the morning session of the conference of the Antioch College "field faculty"—representatives of 175 firms employing Antioch cooperative students—which was held on Saturday, May 9, on the campus at Yellow Springs, Ohio. This convocation of the field faculty, the first of its kind, was part of a celebration which marks the end of ten years of active participation of leaders in industry in Antioch's combination of the practical and liberal aspects of education.

Mr. Dennison, who has been a trustee of Antioch since the reorganization of the college ten years ago, spoke on "The Problems of Organization Engineering." He stated that managers of human beings, like electrical engineers, should aim to align their human forces so that they act with the least friction in the desired direction. For this purpose, organization within the industry should be fitted to the particular task to be done,—planned in adjustment to the external environment and the type of workers. Mr. Dennison stressed the need for co-ordination between heads of departments, and the danger of water-tight division between them. He concluded his discussion with a warning against rigidity of organization. "Rigidity is a disease which is most likely to prove fatal to an industrial organization. Continuous reorganization in adjustment to environment is necessary."

Arthur E. Morgan in his talk on "Co-operation in the Next Decade"—that is, the future of the co-operative plan at Antioch—indicated that it could adapt to either of two tendencies in the modern world: either toward wide distribution of the benefits of mechanical progress, or toward concentration of them in a few hands, with great increase of unemployment and poverty. The college will attempt to train students to follow the first course, said Mr. Morgan, as builders of a new industrial order.

FORTHCOMING MEETINGS

AUGUST 23–29. *Second Triennial Congress, International Industrial Relations Association (I. R. I.).* The Hague, Holland.

AUGUST 26–29. *Silver Bay Industrial Conference.* National Council of Y. M. C. A. Silver Bay, New York.

SEPTEMBER 9–17. *Seventh International Conference of Industrial Psychology.* Moscow, U. S. S. R.

SEPTEMBER 10–12. *Annual Meeting, American Psychological Association,* Toronto, Canada.

Personnel Books

EDITED BY DOUGLAS FRYER

MEN WITHOUT JOBS

THE PROBLEM OF UNEMPLOYMENT. By Paul H. Douglas and Aaron Director. New York: Macmillan, 1931, xix + 505 pp., $3.50.

UNEMPLOYMENT INSURANCE IN GREAT BRITAIN. By Mary Barnett Gilson. New York: Industrial Relations Counselors, 1931, xiii + 560 pp., $5.00.

Reviewed by EDWARD S. COWDRICK, *Industrial Engineer, New York*

For a year or more students of unemployment problems have looked with hopeful expectancy toward a research project being conducted at Swarthmore College, under the direction of Professor Paul H. Douglas of the University of Chicago, and financed by an anonymous donor. The immediate task laid upon Professor Douglas and his associate, Aaron Director, was a preliminary and comprehensive survey of the entire field of unemployment, its causes and extent, and the possible methods of prevention or relief. Their report, published under the title *The Problem of Unemployment*, is an impressive mobilization of facts and statistics, and a painstaking analysis of economic theories.

Professor Douglas first turns his attention to the extent of unemployment. With too much intellectual honesty to claim absolute accuracy for any method of measurement, he nevertheless reviews the most widely accepted indexes and reaches the conclusion that the average ratio of gross unemployment in manufacturing, transportation, mining, and construction industries during the thirty years from 1897 to 1926, was approximately 10 per cent. This proportion, he believes, varies from about 6 per cent in the most prosperous peace-time years to about 20 per cent in periods of business depression.

In discussing the causes and possible preventives of unemployment the authors follow the usual grouping: seasonal unemployment, technological unemployment, and cyclical unemployment. In attacking the controversial question of technological unemployment, Professor Douglas makes an elaborate analysis which seems to lead him a long way toward the conclusion formerly reached by some of the orthodox economists: that as a premanent thing unemployment caused by improving the processes of creating goods is an impossibility. Having made this friendly gesture toward orthodoxy, however, Professor Douglas goes ahead with a convincing argument to show that much temporary technological unemployment may exist, and that, whatever may be the assurance of absorption of labor supply in the long run, much suffering in the "short run" may accrue to displaced workers.

The authors analyze the suggested methods of unemployment prevention, including long-range planning of public works and the various expedients for regularization which have been tried out or proposed within private industry. They find much that is of value in these measures, but conclude that there are limits to the results that can be secured. Therefore they favor unemployment insurance. Moreover, they think unemployment insurance must come at least partially through legislation. Specially, Dr. Douglas advances the outline for unemployment legislation which he has proposed on previous occasions. This plan differs from the bill advocated by Dr. John R. Commons and the Association for Labor

Legislation mainly in that it would divide the expense between employers and workers instead of laying it exclusively upon the former.

In his preface to the book, President Frank Aydelotte of Swarthmore urges continuous fundamental research on the subject of unemployment. He adds:

"Such a study would be useless unless it could be continued through a period of years. With that assurance there seems to be a hope of definite and practical results. If the necessary funds to support it are forthcoming, the research will be undertaken at Swarthmore; if they are not, it is our hope that Professor Douglas' incisive statement of the problem will stimulate the undertaking of a similar study elsewhere."

Miss Gilson's treatise on *Unemployment Insurance in Great Britain* is the second published report evolved in the world-wide study of unemployment being conducted by Industrial Relations Counselors, Inc. The first volume, which appeared in 1930, was *Unemployment Benefits in the United States* by Bryce M. Stewart, in collaboration with Jeanne C. Barber, Mary B. Gilson and Margaret L. Strecker. Volumes dealing with unemployment insurance in Switzerland, Belgium, and Germany are in preparation.

In gathering material Miss Gilson spent practically the entire year 1929 in England and at Geneva, studying at first-hand the baffling problems connected with the British unemployment situation. She visited factories, talked with employers and workpeople, interviewed politicians, publicists and educators, and digested the immense mass of statistical and factual data that has accumulated since the enactment of the original law in 1911. The result is a report which in scope and magnitude far exceeds the modest limits indicated by its title. Miss Gilson's book is, in fact, an encyclopaedic treatise on the whole subject of unemployment in Great Britain, its causes and its social, economic, and political consequences.

An opening chapter outlines the post-war industrial situation and attempts both to measure the extent of unemployment and to classify it as between industries and between sections. The author finds that the unemployment problem "is not a general one affecting all industries, all areas, and all workpeople equally. It is concentrated in a few industries and falls mainly upon one-third of the insured population. The industries most affected are the old, stable export industries."

Subsequent chapters are devoted to the history of various relief measures, the evolution of compulsory state unemployment insurance, and the experience—financial, social and industrial—which has been built up during the administration of the various laws.

In a final section entitled "Summary and Conclusions" Miss Gilson lists various points in which British experience may be of use to the United States, if and when it is found expedient to adopt public unemployment insurance in this country.

Summing up the results of the British experiment, she finds:

"The immediate prospect for the present system of unemployment insurance in Great Britain is not bright. To the continuous volume of unemployment of the post-war period has been added the enforced idleness due to a world-wide depression. At the beginning of 1931 the insured unemployed in Great Britain and Northern Ireland numbered 2,662,842, the highest figure since the scheme was inaugurated.

"The unemployment insurance fund has attained the largest amount of indebtedness to the Exchequer in its history and the debt is steadily mounting. . . . .

"But the unfavorable history of the British system of unemployment insurance since the war and its present patchwork condition have caused very little loss of faith in the principle of insurance against unemployment. It is generally held by the closest observers of the scheme that but for its operation these depressing years would have caused far greater distress than has been experienced. . . . .

"The informed critic realizes that but for the unemployment insurance scheme, the nation would have been entirely dependent upon the poor law and private charity for the relief of distress due to involuntary idleness during the trying post-

war period. What might have happened in that situation is a somewhat unpleasant subject for speculation."

In the technique of its authorship the book shows evidence of mature scholarship and painstaking research. The editorial work and the mechanical format are up to the high standard set by recent publications of Industrial Relations Counselors. Particularly at a time when unemployment insurance is more than ever a political and industrial issue of first magnitude in Great Britain, the book should prove distinctly useful to students in America and abroad.

WAGE SETTING AND LIVING STANDARDS

WAGES: A MEANS OF TESTING THEIR ADEQUACY. By Morris E. Leeds and C. Canby Balderston. Philadelphia: Univ. of Pa. Press, 1931, xi + 79 pp.

Reviewed by GARRET L. BERGEN, *Stevens Institute of Technology*

This monograph outlines a technique for checking the sufficiency of a company's wage policy and practice. Leeds and Northrup Company of Philadelphia provided the research data. The "bottom level of health and decency below which a family cannot go without danger of physical and moral deterioration" was chosen as the criterion. Maintenance budgets, graduated according to family size, were then calculated to express this bottom level in terms of dollar requirements in Philadelphia. These budgets were, of course, based on the tastes and requirements of skilled and semi-skilled workers, and are not applicable to clerical employees. For example, the maintenance budget of a family, comprising man, wife and one child was set at $1452.41. The next step was to determine statistically the ages of the typical Leeds and Northrup employee when each increase in size of family occurs, and to translate budgets developed for these varying ages into budgets for varying lengths of service. It was found that the typical employee is hired at the age of nineteen (service before this age is ignored as being of a training nature), marries after seven and a half years of service, has his first child at the end of the ninth year and his third child when he has been employed fifteen years. Budgets expressed in terms of these ages and lengths of service thus provide the "measuring sticks" for use in checking the adequacy of the annual earnings of each employee of more than one year's service. Individuals with earnings below their respective age and service budgets are thus spotted for special consideration. The budgets can also be used to compare the actual wage history of a given employee with the maintenance requirements of the typical worker under the same conditions. This comparison is indicative of the trend of earnings under the company's promotion policy. Obviously, the actual figures and results here presented cannot be applied directly to another company since they are based on the experience of a single organization in a specialized industry. However, the work is of value in demonstrating a not too costly technique which any company can use easily as an additional approach to its periodic payroll audit.

PROGRESS IN HUMAN ENGINEERING

RESTRICTION OF OUTPUT AMONG UNORGANIZED WORKERS. By Stanley B. Mathewson. With chapters by William M. Leiserson, Arthur E. Morgan, and Henry S. Dennison. New York: Viking Press, 1931, x + 212 pp., $3.00.

ORGANIZATION ENGINEERING. By Henry S. Dennison. New York: McGraw-Hill, 1931, viii + 204 pp., $2.50.

Reviewed by JOHN J. FURIA, *Professor of Industrial Engineering at Manhattan College, and Consulting Industrial Engineer, New York City*

These two books have many common characteristics. Mr. Mathewson has shown conclusively that there is very definite "*restriction of output among unorganized workers*"; and Mr. Dennison that *organization* is a task requiring the training and technique of *engineering*. We need more such books in these days of underconsumption. Both are replete with implications for action, as preventive medicine and as cure for the business and industrial ailments from which we are suffering today. These books are, on the one hand, of the type that causes annoyance to the reader if he is interrupted while absorbed in them and, on the other hand, they are not of the type that is put on the bookshelf after a first reading.

Mr. Mathewson has undertaken and directed a research, employing largely the techniques of "disguised interviews," which lies in a field that is bound to develop valuable data and conclusions on personnel theory and practice. These are difficult techniques—treacherous ones in the hands of the wrong person, particularly because of the almost inevitable unconscious bias on the part of the interviewers. It is a pity that Mr. Mathewson did not discuss his techniques and evaluate them in greater detail. The very fact that positive data of such large volume were secured is evidence that the author and his staff possessed unusual facility in these techniques. The data are particularly convincing because almost any reader can add similar data from his own personal experiences, regardless of whether "he sits on the worker or manager side of the industrial fence."

The field explored is practically virgin. Writers who have investigated restriction, or written about it without investigation, have confined their studies almost exclusively to trade union policy and practice. If Mr. Mathewson had accomplished nothing further than to erase the false notion that restriction of output is an activity found principally in the ranks of organized labor, his research would have been on this score alone a valuable contribution. His discovery of the forces at work and of the methods used, elevates the study to the first rank and gives food for thought alike to the worker and the manager, the sociologist, and the economist.

The data are given in full by Mr. Mathewson, with classified comments. The responsibility for the conditions disclosed, and other interpretations of the significance of the survey, are ably discussed in concluding individual chapters by Professor Leiserson, an economist; Mr. Dennison, a manufacturer; and President Morgan of Antioch College.

With the interpretations of Professor Leiserson the reviewer cannot agree in full, largely because he cannot accept the theory that labor is a commodity, which is the foundation on which Professor Leiserson's discussion structure rests, and which is indicated in the passage: "Since the laborer is bound to limit his output to prevent demoralization of his market in the same way as businesses do, why not frankly recognize the fact, and make it a matter of open business negotiation?"

Mr. Dennison's chapter might well be quoted in full in a review of this book. Each sentence "hits the bull's eye" squarely in the center. Throughout we find sound philosophy with specific implications for sound practice, out of the background of his rich experience. Mr. Dennison strikes a keynote when he says: ". . . Success is

more likely to attend upon efforts to clean up the causes of restriction than upon attempts more directly to check restriction itself. . . . Eventually to solve the ultimate problem arising from the need of setting standards (and rates) it will be necessary to have a work laboratory as we now have a chemical laboratory."

President Morgan points out forcibly that "restriction of output is a social phenomenon of very large importance permeating many phases of our industrial life." He surveys Mr. Mathewson's study with a critical eye when he concludes that: "To a large extent the report ignores such cases as laziness or resistance to meeting imposed standards of quality or quantity—cases which cannot be so readily justified;" and he elaborates on this theme from his own experiences.

If Mr. Dennison's book were a "sound movie," a critic might state that it begins with a theme song whose melody can be heard in the background from beginning to end. Its chorus is: "To understand fully the nature of the men and women in a working group, and to relate them to each other and to organization as a whole in such ways that quite literally they 'work with a will' is a task demanding powers of analysis, sympathy, and imagination. Attention must focus upon causes and effects in the field of human behavior. Effective action must be founded in an inclusive and sympathetic but nevertheless accurate, detached and scientific appreciation of human nature. Hence it is here regarded as a task requiring the training and technique of an engineer."

This thought is developed by many analogies between human and technical engineering. For example: "As in electrical engineering we organize a field of electrical forces and resistances by arranging them into a structure of maximum usefulness, so in organization engineering we must seek to arrange a field of human forces and resistances—human motives, purposes, feelings, knowledges, and abilities—so that they interwork for maximum usefulness."

The book should perhaps have been given a title which would show more specifically that it deals with the "personnel problem" exclusively and indicate the author's psychological approach to the "task requiring the training and technique of an engineer." The author's apology in the preface that ". . . There are many books already in print covering the separate problems of organization engineering" is characteristic Dennison modesty. Mr. Dennison's psychological approach with engineering technique is the opening up of a new area in organization discussion.

BUSINESS EDUCATION AND ACADEMIC INERTIA

University Education for Business. By James H. S. Bossard and J. Frederic Dewhurst. Philadelphia: Univ. of Pa. Press, 1931, 590 pp., $5.00

Reviewed by G. Rowland Collins, *New York University*

"The time is past when a youth is initiated into business by sweeping out the office . . . . America sincerely believes in economic education." So wrote that keen-eyed foreign observer, André Siegfried, in 1927.

How often it remains for a detached observer to point out an educational trend! It is easy for the conservative American educator to busy himself burrowing in the dust-bins of the centuries while the economic world goes plunging by. And it seems difficult for many to recognize and grapple with the fact that during the past three decades university education for business has come of age.

Collegiate preparation for business is at this moment a most significant phase of American university education. And rightly so: the authors of this volume present a vigorous statement of justification. From the standpoint of society they see clearly. They recognize the fact that business is no longer "trade," a mere something to be

tolerated but despised. They realize that business has taken its place as a social institution, along with the family, the government, the church, and the school, and that the welfare of social institutions in this modern age depends more than ever upon a socially-minded and technically efficient control of business.

Entirely apart from whether or not an individual citizen is engaged in a minutely particularized phase of business activity, "business" touches his life at myriad points. He cannot escape its influence. Any attempt to flee from its present reality, or merely to lean back in skeptical observation of the passing scene, is hardly courageous. These are the considerations that prompt Professors Bossard and Dewhurst to state their central conviction that "the position of dominant and pervasive power and influence which business has come to exercise in our civilization means that adequate professional preparation for business is an educational problem of paramount importance."

In spite of the enthusiasm of the authors for their cause, they have succeeded in producing a sound, unbiased, and penetrating analysis of American experimentation in collegiate education for business. They have neither magnified accomplishments through long-range spectacles or minimized them in near-sighted details.

University Education for Business is a quantitative and qualitative survey of trends. Its subject matter ranges through such chapter topics as Occupational Opportunities for College Graduates in Business, Training and Qualifications for Positions in Business, Reading Interests of Business Men, Collegiate Schools of Business—Their Organization and Objectives, The Organization of Business Curricula, Reported Trends in the Changing Business Curricula, Teaching Methods and Problems, and Problems of Faculty and Student Personnel.

Throughout, the authors show no disposition to avoid a careful consideration of the academic ills that exist in the collegiate schools of business. They pay their respects to the needless and questionable growth of specialized courses, to mere "window dressing." They note a somewhat decreasing emphasis upon technical courses, and urge a more objective determination of curricula content. They condemn carelessness or defective judgment in the selection of teaching personnel. They make the penetrating observations that some collegiate business school faculties are "built," while "others merely attain a certain growth," and that a few are made up "chiefly of time servers and mediocre neophytes."

The treatment of the "unfriendly or modifying influences" that have hampered the rational development of business curricula to meet definite and clear-cut objectives is no less sound and sharp in statement. The authors emphatically call attention to the attitude of some general university administrations, with respect to financial support of the collegiate school of business. They record the facts that certain schools of business have been utilized "to make a net financial contribution to the general university budget," and that at other places "they have been starved, consciously and purposively, to prevent their development as competitors to other schools and programs of the university." They note the tendency to develop business curricula in a "certain measure to meet the demands or to avoid the antagonism of the arts faculty, with more consideration to such demands than to the obvious needs of the students." They tag the defense mechanisms of those petty economists who oppose the development of business subjects as well as any "rigorous application of the inductive method" to the field of economics.

University Education for Business is a sane, interesting, and comprehensive account of an American educational experiment that in any widespread sense is but 30 years of age, and at the moment stands just beyond the tip-edge of its full maturity. There is meat in every paragraph. In the opinion of the reviewer, this is a volume that should be read in conjunction with the treatment of business education that appears in Volume II of the *Survey of Land Grant Colleges and Universities*, Office of Education Bulletin, Number 9, issued by the United States Department of the Interior.

If there is any significant weakness in the

volume by Professors Bossard and Dewhurst, it is that their survey fails to attack, in detail, the problem of development of a body of knowledge to enrich business instruction—the relationship of business research to business education.

Briefer Mention

EDUCATIONAL ACHIEVEMENT IN RELATION TO INTELLIGENCE. By Charles W. St. John. Cambridge: Harvard Press, 1930, xiv + 219, $3.50.

An investigation of the relation between educational achievement and intelligence as shown by teachers' marks, promotions, and scores in standard tests in certain elementary grades. The subjects of the investigation were 503 boys and 455 girls in the public schools of a residential suburb of Boston, all members of the group being studied by Dearborn in the Harvard growth study. Results indicate a positive correlation of about .50 between I.Q. and the quality of educational achievement. School progress also correlates positively with I.Q. Many marked exceptions to the general rule of correlation are found. The achievement of boys is lower on the average than that of girls, and the correlations between I.Q. and achievement are also lower for boys. Educational achievement is much less constant than is I.Q. Marks in effort on the one hand, and achievement-test scores on the other hand, correlate with other achievement criteria about as highly as I. Q. does. Teachers' ratings and marks indicate a halo effect. Case studies as well as the statistical study are included.

GENERAL PSYCHOLOGY FOR PROFESSIONAL STUDENTS. By A. R. Gilliland, J. J. Morgan, and S. N. Stevens. New York: Heath, 1930, VII + 439 pp., $3.20.

Under the headings of such topics as the purpose of psychology, the human organism, innate behavior, sensory processes, attention, perception, learning, memory, thinking, emotional behavior, mental alertness, personality, social behavior, personal efficiency, motivation, sleep, dreams, hypnosis, and mental health, the authors cover the material usually covered in a text of general psychology. The emphasis, however, is always more on factual material and practical applications rather than theoretical discussions.

PSYCHOLOGY OF EARLY CHILDHOOD; UP TO THE SIXTH YEAR OF AGE. By W. Stern. London: Allen and Unwin, 1930, xi + 612 pp.

The principal changes in the present revision are as follows:

"In the general theory of child-psychology the personal standpoint has been even more emphasized than before, whilst at the same time other psychological theories such as mental-psychology, form-psychology, psychoanalysis and individual-psychology have been exhaustively treated, criticized and discussed in contradistinction to the theory of personality."

The Montessori method is also discussed critically. The results of experimental investigations have been treated more fully, and two supplements are included, one by Kurt Lewin on expression-movements in children, which is accompanied by a set of illustrative plates, the other by Heinz Werner on magic in early childhood. The book is written in a manner which should make it of value to parents and educators as well as to psychologists. An extensive bibliography is appended.

LABOR AND LUMBER. By Charlotte Todes. New York: International Publishers, 1931, 208 pp., $2.00.

Labor and Lumber is one of a series of books prepared by the Labor Research Association. Early chapters describe the demoralized conditions in the lumber business. "Overcapitalization and overproduction is the chronic condition of the industry. . . . The chaos of the capitalist system of production is nowhere more clearly evident than in the lumber industry, with its enormous overdevelopment, cut-

throat competition and chronic overproduction in the face of declining markets."

If the author feels any sympathy for the leaders of an industry thus demoralized, there is no indication of it in her discussion of labor conditions in the forests and mills. Employers are charged with maintaining bad living conditions, low wages, yellow-dog contracts, black lists, exorbitant rents, and enforced trading at company stores. The Loyal Legion of Loggers and Lumbermen is denounced as "merely a company union covering many companies instead of one," and is accused of hostility to trade unionism.

The book traces various union struggles, beginning with the first organization under the Knights of Labor in 1878. The concluding chapter advocates organization of workers in an industrial union affiliated with the Trade Union Unity League.

HOME GUIDANCE FOR YOUNG CHILDREN: A PARENTS' HANDBOOK. By Grace Langdon. New York: John Day, xvii + 405 pp.

A simple, straightforward discussion of many of the daily problems which parents will encounter from the moment of conception to the child's sixth year. Much practical advice is given regarding such important questions as eating, sleeping, toileting, playing, etc. It tells what habits children are ready to learn at different levels of development, and endeavors to instruct in the best methods of guiding the acquisition of these habits. Final chapters are concerned with the socializing of the child and the importance of parent's attitudes.

COLONIAL WOMEN OF AFFAIRS. By Elizabeth Anthony Dexter. New York: Houghton Mifflin, xxii + 223 pp. $3.50.

A revised and enlarged edition of Mrs. Dexter's interesting account of the varied activities of American women in colonial times—stories of the New Woman when she was really new, or before it was necessary for her to be "new" in order to have a vigorous vocational life. Chapters are given regarding the women who kept taverns—important meeting places in earlier days, the "she-merchant," the artificer, the ministering angel, the school dame, the landed proprietor, and writers, orators and printers. It is clear that we shall have to revise our conceptions of the restricted life of women in the formative years of our country. We have known that women were abundantly occupied within their domestic establishments; Dr. Dexter shows how frequently they were also engaged in outside duties.

THE PUBLIC CONTROL OF BUSINESS. By Dexter Merriam Keezer and Stacy May. New York: Harper, 1930, xi + 267 pp., $3.00.

A business so large that it has no effective competitors, or one which deals in services and commodities "affected by the public interest," cannot be left to the automatic control of competition. It requires regulation by the government. Three possible methods of accomplishing this regulation have been developed in the United States: action under the anti-trust laws, action by the Interstate Commerce Commission and similar bodies, and government ownership and operation. Much of the effectiveness of the first method has been lost by judicial rulings on the question of size of corporations which may be considered as trusts and subject to the anti-trust law. Regulation by commission has also been hampered by Supreme Court decisions placing restrictions upon effective control of prices and narrowly defining the scope of "public interest." The only method which has not been undermined by judicial interpretation is that of government ownership and operation. If regulation in the near future is to be effective, it will probably have to resort to that.

WAGE METHODS AND SELLING COSTS. By Anne Bezanson and Miriam Hussey. Philadelphia: Univ. of Pa. Press, 1930, xxii + 405 pp., $4.50.

Reports from 145 department stores show prevailing wage-methods used: straight salary, 60 (including most of the smaller stores), salary plus commission on all sales, 43; quota-bonus, 22; straight commission, 5; others, 15. Few stores use one plan throughout all departments. Intensive an-

alysis was made of sales, earnings, length of service, and labor turnover in the hosiery, ready-to-wear, men's clothing, and house-furnishings departments of 31 stores. Higher volume of sales per worker is associated somewhat with lower selling cost; i.e., payment is not on the average directly proportioned to net sales, but salaries and drawing accounts are adjusted rather closely to individual sales under all systems of payment. All employees, of course, do not have equal opportunities to increase their sales by increased effort. The authors suggest some managerial improvements.

How They Carried the Mail. By Joseph Walker. New York: Sears Publishing Company, 1930, x + 305 pp., $3.00.

A history of mail carriers from 3000 B.C. to the present. An appendix contains schedules of mail routes in the United States to Central and South America.

Though written primarily for young people, it tells a story which adults also will find interesting. The book is copiously illustrated.

The Wonderful Story of Industry. By Ellen Friel Baker. New York: Crowell, ix + 308 pp., $2.50.

This book was written to help the young boy to a better understanding of the world of industry. It takes him through factories, where he sees the manufacture of paper, matches, ice, glass, and many other commodities.

Through this survey of occupations it is hoped that youthful readers may receive some help in choosing their vocations.

Selling Yourself. By Edward F. Dalton. New York: Ripton Company, 1930, 161 pp., $2.00.

Another manual prescribing for success, it takes the not too new point of view that personal qualities, even as vacuum cleaners and toothpaste, can and must be sold. Before outlining the specific steps to be followed in selling oneself, the author discusses personality and suggests methods for its improvement. A large part of the book is devoted to inspirational sketches of prominent industrialists and their achievements.

Industrial Hygiene for Schools. By Jesse F. Williams and Delbert Oberteuffer. New York: McGraw-Hill, 1930, xiv + 280 pp., $2.00.

A textbook prepared for pupils who will soon enter industrial life. Discusses the principles of personal hygiene, and the conditions to be guarded against in industries. Concrete examples and illustrations are given in profusion.

The portions of chief interest to the personnel worker are those dealing with prevention of health hazards, accidents and occupational diseases.

Problems in Industrial Accounting. By Thomas H. Sanders. New York: McGraw-Hill, 1930, xxi + 816 pp., $6.00.

This is a revised edition of a text-book prepared under the auspices of the Arthur Lowes Dickinson Fund for accounting research at the Harvard Graduate School of Business Administration. Throughout the book the case method is followed. Each problem is based upon a specific situation, which is described in some detail and is followed by a list of questions. There are more than 150 of these problems, grouped under various subjects to which cost accounting is applied. The book covers not only the routine of administrative accounts, but such related subjects as bonus plans of wage payment, executive compensation, and the organization and management of accounting departments.

Vocational Guidance in Rehabilitation Service. Federal Board for Vocational Education, Washington, D. C., Bulletin No. 148, Number 20.

A brief presentation of methods to be used in counseling handicapped persons in the Rehabilitation Service.

Mrs. Grundy: A History of Morals Intended to Illuminate Present Problems in Great Britain and the United States. By Leo Markun. New York: Appleton, 1930, xii + 666 pp., $5.00.

This lively and well-illustrated volume surveys the changes in accepted standards of conduct from the time of Henry VIII

in England to the present. It touches upon public and private morals, family relations, church and theater, and concludes that the changes have been more apparent than real. Irreverence for authority, sexual laxity, even scanty skirts and short hair for women, seem to be recurring phenomena, and the Mrs. Grundys of today are occupied with much the same complaints as their predecessors of four centuries ago.

New Books

LABOR RELATIONS

PERSONNEL PROBLEMS: METHODS OF ANALYSIS AND CONTROL. By Felix E. Baridon and Earl H. Loomis. New York: McGraw-Hill, 1931, 452 pp., $5.00.

STABILITY OF EMPLOYMENT. Compiled by Julia Emily Johnsen. New York: Wilson, 1931, 206 pp., $.90.

THE PROBLEM OF UNEMPLOYMENT. By Paul Howard Douglas and Aaron Director. New York: Macmillan, 1931, 524 pp., $3.50.

THE X Y Z OF COMMUNISM. By Ethan Theodore Colton. New York: Macmillan, 1931, 437 pp., $3.00.

UNEMPLOYMENT BENEFITS IN THE UNITED STATES: THE PLANS AND THEIR SETTING. By Bryce W. Stewart and Others. New York: Industrial Relations Counselors, 748 pp., $7.50.

WORLD WORKERS' EDUCATIONAL MOVEMENTS: THEIR SOCIAL SIGNIFICANCE. By Marius Hansome. New York: Columbia U. Press, 1931, 594 pp., $5.00.

INDUSTRIAL EDUCATION

AMERICAN HIGH SCHOOLS AND VOCATIONAL SCHOOLS OF 1960. By David Samuel Snedden. New York: Teachers College, 1931, 128 pp., $1.50.

ELEMENTS OF BUSINESS TRAINING. By John Marks Brewer and Others. Boston: Ginn, 1931, 471 pp., $1.68.

ROOTS OF VOCATIONAL EDUCATION. By William P. Sears, Jr. Edited by J. C. Wright. New York: Wiley, 1931, 310 pp., $2.75.

SAFETY EDUCATION. By Idabelle Stevenson. New York: Barnes, 1931, 167 pp., $1.00.

SELF-MANAGEMENT IN SELLING. By David R. Osborne. New York: Harper, 1931, 267 pp., $3.50.

TEACHING EVENING AND PART-TIME CLASSES IN VOCATIONAL AGRICULTURE. By Gustavus Adolphus Schmits and William Arthur Ross. New York: Century, 1931, 294 pp., $2.25.

THE CHANGING EDUCATIONAL WORLD, 1905–1930: PAPERS READ ON THE OCCASION OF THE TWENTY-FIFTH ANNIVERSARY OF THE COLLEGE OF EDUCATION, UNIVERSITY OF MINNESOTA. Edited by Alvin C. Eurich. Indianapolis: U. of Minn. Press, 1931, 323 pp., $3.00.

THE EDUCATION OF ADULT PRISONERS: A SURVEY AND A PROGRAM. New York: National Society of Penal Information, 1931, 477 pp., $2.50.

MANAGEMENT AND ADMINISTRATION

AMERICA CHAINED: A DISCUSSION OF "WHAT'S WRONG WITH THE CHAIN STORE." By Montaville Flowers. Pasadena: Montaville Flowers Publicists, 1931, 351 pp., $3.00.

BORROWING AND BUSINESS IN AUSTRALIA: A STUDY OF THE CORRELATION BETWEEN IMPORTS OF CAPITAL AND CHANGES IN NATIONAL PROSPERITY. By Gordon Wood. New York: Oxford, 1930, 292 pp., $4.75.

HOW TO INTERVIEW. By W. V. Bingham and B. V. Moore. New York: Harper, 1931, 320 pp., $4.00.

STORE MANAGEMENT. By Norris A. Brisco. New York: Prentice-Hall, 1931, 424 pp., $2.50.

ADVERTISING AND PUBLICITY

ADVERTISING REAL ESTATE. By Lloyd D. Herrold. New York: McGraw-Hill, 1931, 325 pp., $4.00.

THE ETHICAL PROBLEMS OF MODERN ADVERTISING. By the William A. Vawter FOUNDATION. New York: Ronald, 1931, 139 pp., $2.00.

VERTICAL COÖPERATIVE ADVERTISING. By Lawrence C. Lockley. New York: McGraw-Hill, 1931, 267 pp., $3.00.

OCCUPATIONAL ANALYSES

HEATING AND VENTILATION. By John R. Allen and Others. New York: McGraw-Hill, 1931, 426 pp., $4.00.

OCCUPATIONAL INTERESTS AND PERSONALITY REQUIREMENTS OF WOMEN IN BUSINESS AND THE PROFESSIONS. By Grace E. Manson. Ann Arbor: U. of Mich., 1931, 136 pp., $1.00.

GUIDANCE

GETTING THE JOB YOU WANT. By Arthur V. Farr. New York: American Institute of Educational Research, 1931, 62 pp., $1.00.

VOCATIONAL INFORMATION

A DEFENSE OF PHILOSOPHY. By Ralph Barton Perry. Cambridge: Harvard, 1931, 56 pp., $1.00.

FEW SECRETS OF THE METALLURGIST SIMPLY TOLD. By G. W. Hinkley. Milwaukee: Caspar, Krueger, Dory, 1931, 100 pp., $2.00.

FUNDAMENTALS OF THE WOOD-WORKING TRADES. By John F. Reid and Gordon H. Higgins. New York: Wiley, 1931, 244 pp., $2.75.

APPLIED OFFICE PRACTICE. By Abbie A. Morrill and Others. Boston: Heath, 1931, 388 pp., $1.96.

THE AUTOBIOGRAPHY OF AN ENGINEER. By William Le Roy Emmet. Albany: Fort Orange Press, 1931, 227 pp., $2.00.

COLLEGE PERSONNEL

A PERSONNEL STUDY OF TEN THOUSAND IOWA HIGH SCHOOL SENIORS. By Joseph Raymond Gerberich. Iowa City: U. of Iowa, 1930, 112 pp., $1.00.

PSYCHOLOGY

BUILDERS OF DELUSION: A TOUR AMONG OUR BEST MINDS. By Henshaw Ward. Indianapolis: Bobbs-Merrill, 1931, 381 pp., $3.50.

CONTEMPORARY SCHOOLS OF PSYCHOLOGY. By Robert S. Woodworth. New York: Ronald, 1931, 238 pp., $2.50.

PERSONALITY AND INTELLIGENCE: A STUDY OF SOME RESPONSES OTHER THAN INTELLECTUAL NOTED IN A SIMPLE MENTAL TEST SITUATION. New York: Teachers College, 1931, 62 pp., $1.50.

SOCIAL PSYCHOLOGY. By Joseph Kirk Folsom. New York: Harper, 1931, 719 pp., $3.50.

THE CRIMINAL, THE JUDGE, AND THE PUBLIC: A PSYCHOLOGICAL ANALYSIS. By Franz Alexander and Hugo Staub. Translated by Gregory Zilboorg. New York: Macmillan, 1931, 258 pp., $2.50.

THE PSYCHOLOGY OF THE INVENTOR: A STUDY OF THE PATENTEE. By Joseph Rossman. Washington: Inventors Pub., 1931, 262 pp., $3.00.

THE STORY OF PSYCHIC SCIENCE. By Hereward Carrington. New York: Ives Washburn, 1931, 399 pp., $5.00.

SOCIOLOGY

BIOLOGY IN HUMAN AFFAIRS. Edited by Edward Murry East. New York: McGraw-Hill, 1931, 410 pp., $3.50.

EDUCATION, CRIME, AND SOCIAL PROGRESS. By William Chandler Bagley. New York: Macmillan, 1931, 165 pp., $1.20.

SOCIAL ATTITUDES. Edited by Kimball Young. New York: Holt, 1931, 394 pp., $3.00.

TESTS AND CHALLENGES IN SOCIOLOGY. By Edward Alsworth Ross. New York: Century, 1931, 108 pp., $1.00.

ECONOMICS

ECONOMIC BEHAVIOR: AN INSTITUTIONAL APPROACH. By Members of the Department of Economics, New York University. Boston: Houghton, 1931, 2 v., 613 and 564 pp., $6.00.

ECONOMIC CONTROL OF ENGINEERING AND MANUFACTURING. By Frank L. Eidmann. New York: McGraw-Hill, 1931, 402 pp., $4.00.

ECONOMIC PROBLEMS OF MODERN LIFE. By S. Howard Patterson and Karl W. H.

Scholz. New York: McGraw-Hill, 1931, 695 pp., $3.75.

OUTLINES OF AGRICULTURAL ECONOMICS. By Henry Charles Taylor. New York: Macmillan, 1931, 626 pp., $3.25.

THE INSECURITY OF INDUSTRY. Edited by Ernest Minor Patterson. Philadelphia: American Academy of Political and Social Science, 1931, 210 pp., $2.00.

VALUE AND INCOME. By Arthur Eli Monroe. Cambridge: Harvard, 1931, 249 pp., $3.50.

WORLD ECONOMIC DEPRESSION: REMEDIES. New York: Arthur Hill, 152 pp., $2.50.

Current Periodicals

PREPARED BY LINDA H. MORLEY, *Industrial Relations Counselors, Inc.*

ABSENTEEISM

YOUNG, HAROLD T. (Personnel Superintendent, The Employers' Group, Boston). Practical plan for reducing absenteeism in the office. *Office Economist*, April, 1931, vol. 13, p. 3-5, 14.

With this plan of maintaining an efficient centralized attendance system The Employers' Group cut 40 per cent off their total of lost working days. Daily attendance sheet is kept for each employee, which must be signed each morning. Awards are given for good records.

ACCIDENT STATISTICS

Accident experience in the iron and steel industry to the end of 1929. *Monthly Labor Review*, April, 1931, vol. 32, p. 867–884.

Tables give accident frequency rates, accident rates by department and period, and accident frequency and severity rates by state and year.

AGE

DOOLEY, C. R. (Personnel Manager, Standard Oil Company of New York). Large corporation and the older worker. *Annals of the American Academy of Political and Social Science*, March, 1931, vol. 154, p. 45–48.

Discusses the security of the older worker who is already employed; the ones seeking employment; personal qualities of those seeking jobs, and adult education as a means of keeping the older worker "growing."

COLLEGE MEN IN BUSINESS

MITCHELL, TERRY (Frick Co. Inc). Do college men stick? If not, look to your training program. *Factory and Industrial Management*, May, 1931, vol. 81, p. 788–790.

Suggests that business employers bear in mind that the college graduate has brought with him ideals and principles of fair play and service, which, when developed along sound lines, can mean much to the organization. Thinks careful choice of applicants from the universities, and individual training by older executives in the industrial plants, would solve the problem of successfully establishing the college man in business.

CONSUMERS' RESEARCH

SCHLIMCK, F. J. New economic agency established to guide consumers' purchasing. *American Federationist*, April, 1931, vol. 38, p. 409–412.

Consumers' Research, Inc., a non-profit, non-commercial organization, devotes itself to giving advice to its customers that they may get more and better things for their expenditures. Service is available in two forms, a handbook listing recommended and not-recommended trade brands applying to 400 kinds of commodities, and a series of bulletins, issued 6 or 8 times a year.

EMPLOYMENT

STEVENS, HAROLD W. Employment "sickness and death rates." *Journal of Industrial Hygiene*, February, 1931, vol. 13, p. 56–64.

Discusses need for laying a foundation for practical measures, sounder than impressions and sentiments, in maintaining employment standards. Thinks employment and discharge facts are quite as significant to our economic and social health as are births and deaths to our physical public health.

EXCHANGES

GILL, GEORGE E. (Director, Indianapolis Employment Bureau). Bringing job and worker together. *Nation's Business*, February, 1931, vol. 19, p. 52, 54, 56.

"Any plan which facilitates employment reacts to the benefit of the employer, the would-be employee, and the community at large. Such a plan has been worked out in Indianapolis through intelligent cooperation. Mr. Gill tells of some of the problems of this employment service and the peculiar need which it has been filling for the past six years."

FOREMANSHIP

PIERCE, A. R. Modified foremanship conference. *American Machinist*, April 2, 1931, vol. 74, p. 537–538.

"Outline of modified program developed by National Metal Trades Association; examples illustrate progressive steps in development of discussion as written on blackboard."

HOURS OF LABOR

BRAGDON, JOSEPH (Alabama Military Institute). Trend toward a five-hour day. *Current History*, March, 1931, vol. 33, p. 854–858.

History of the developments leading to the establishment of shorter working hours, including the modern plan of reducing working time to meet the condition of over-production.

GREEN, WILLIAM (President, American Federation of Labor). Five-day week. *Harvard Business Review*, April, 1931, vol. 9, p. 270–276.

Advocates five-day week as practical solution in the adjustment between productivity and work hours. Believes the shorter week would allow for opportunities for cultural development and social service for those with small incomes. Gives history of the five-day week movement.

HYGIENE

Industrial hygiene: workshops. *Occupation and Health*, Brochure, 1931, no. 248, p. 1–8.

Describes general provisions, such as situation and exposure of buildings, floor, roof, windows, cleanliness, temperature, etc., and special provisions, such as noises, dust, odors, etc. Gives a summary analysis of laws, regulations, and orders which have been instituted in the different countries regarding hygiene in workshops.

INCENTIVES

FLORA, CHARLES P. (Manager, Standards Dept., Hood Rubber Co.). Incentives for maintenance departments. *Society of Industrial Engineers Bulletin*, April, 1931, vol. 13, p. 11–20.

Time studies taken for different jobs and standards obtained. These were applicable to over 50 per cent of workers. Job card data tabulated to show for each job date, order number, location, distance moved, actual points, number of men on job, speed of working, etc. Bedeaux point system used as unit of measure. Good incentive system points out efficient as well as inefficient workman.

INDUSTRIAL RELATIONS

HAIGH, DOUGLAS. New industrial England; where the foundations of industrial peace are laid; example no. 35—Messrs. Morris Motors, Ltd. *Unity*, March, 1931, vol. 9, p. 231–233.

Another article of a series published monthly, each giving an account of what one industrial firm is doing to raise the standard of well-being of its own people. Covers hours, savings, benefits, welfare, etc., for Messrs. Morris Motors, Ltd.

HALL, E. H. Securing the cooperation of the employee. *Electric Railway Journal*, April, 1931, vol. 75, p. 176-177.

"Ways and means of securing cooperation of electric railway employees; no man will do his best unless he is proud of the company and his connection with it; attitude cannot be developed by printed rule books, but only by direct personal contact with management."

INSURANCE

FILE, L. K. (B. A.; F.I.A.; F.A.S.; Associate Actuary of the Canada Life Assurance Co.). Disability benefits in conjunction with life insurance policies. *Journal of the Institute of Actuaries*, December, 1930, vol. 61, p. 214–267.

Gives history of the development of disability writing in both the United States and Canada, with the practices of companies writing disability coverage.

MURPHY, J. PRENTICE (Executive Secretary, Seybert Institution; Executive Secretary, Children's Bureau of Philadelphia). Dependency in old age. *Annals of the American Academy of Political and Social Science*, March, 1931, vol. 154, p. 38–41.

Suggests that correction in part must come not only through an increase in family incomes, but through a form of social insurance, which will give protection to the aged.

RUBINOW, I. M. (Ph.D.; M.D.). Conflict of public and private interests in the field of social insurance. *Annals of the American Academy of Political and Social Science*, March, 1931, vol. 154, p. 108–116.

Opposition to social insurance is largely in defense of private interests, according to Dr. Rubinow. Such insurance has been going forward for fifty years with no single structure demolished in that time. Believes it is elementary step towards better utilization of the available economic resources of modern society for the common good.

LABOR LEGISLATION

Important Labor Legislation of 1931: review of amendments of labor law and compensation law. *Industrial Bulletin* (N. Y.), April, 1931, vol. 10, p. 202, 225.

Total of 118 bills offered to directly amend either the labor or workmen's compensation laws in New York state.

Labor legislation of 1930. *Monthly Labor Review*, March, 1931, vol. 32, p. 632–636.

Topical outline of State legislation, with the exception of workmen's compensation.

Organization and functions of governmental labor agencies. *Monthly Labor Review*, March, 1931, vol. 32, p. 532–571.

Article presents broadly the structure and functions of the various governmental agencies dealing with labor activities generally and specifically.

LOANS

RYAN, FRANKLIN W. Family finance in the United States. *Journal of Business*, October, 1930, vol. 3, p. 402–423.

Discusses growth of small loan business in the United States. Believes personal finance companies perform a valuable service to retail trade.

MANAGEMENT

HENDERSON, CHARLES (President, S. S. White Dental Manufacturing Company). Some experiences in managing during the past decade. *Bulletin of the Taylor Society*, February, 1931, 16, p. 34–41.

Experience of S. S. White Dental Manufacturing Company, in maintaining standards of the company's products. Gives reasons why the older employee is considered an asset to the organization.

NURSING SERVICE

HODGSON, VIOLET H. Industrial nurse in gear with the machinery for human adjustment. *American Journal of Public Health*, December, 1930, vol. 20, p. 1323–1327. (Abstract in *Social Science Abstracts*, May, 1931, vol. 3, p. 706.)

Responsibility of nurse to consider needs of employee in the home, to cooperate with school and visiting nurse in any program for community health; to bring about better employer-employee relations in the plant through her care of the sick and injured, and her interest in safety promotion and accident prevention.

KOWALKE, E. Industrial nursing service provided by a public health nursing association. *Public Health Nurse*, December, 1930, vol. 22, p. 615–617. (Abstract in *Journal of Industrial Hygiene*, March, 1931, vol. 13, p. 60–61.)

Milwaukee Visiting Nurse Association provides industrial nursing services. Contracts made on yearly basis with the different companies. The full-time nurses make their headquarters at the plant; when a visit is necessary in the home of any

employee the Association sends the nurse in whose district the worker lives. Industrial nurse submits monthly report to the Association—the case records are filed with the company.

OCCUPATIONS

Retail Credit Company. Manufacture of pearl buttons; Dry cleaning and dyeing; Felt hat manufacture. *Industry Report*, April, May, June, 1931, vol. 6, p. 31–40; 41–52; 53–68.

Job specifications, with the hazards for each defined, are given for the three industries. Processes of manufacture are also included.

PERSONNEL MANAGEMENT

FOGLER, R. H. (Director of Personnel, W. T. Grant Co.). Making an organization personnel-conscious and effective. *Management Review*, April, 1931, vol. 20, p. 99–101.

When the employees, through participation in joint conferences, assist in making plans and establishing aims; when the working conditions and health of the individuals become a vital personnel problem; then the organization personnel becomes conscious and effective.

READING

TEAD, ORDWAY (Editor, Economic and Business Books, Harper and Brothers). Does reading pay? *Factory and Industrial Management*, April, 1931, vol. 81, p. 609–611.

Business reading should be part of day's work; supplies new power, new ideas, new lubrication for the running of the business machine. Should not be limited entirely to vocational subjects—better to include some of general economic character, biography, fiction or travel.

SAFETY

HEINRICH, H. W. (Assistant Superintendent, Engineering and Inspection Division, Travelers Insurance Co.). Safety in gas manufacturing. *Travelers Standard*, May, 1931, vol. 19, p. 93–103.

Suggests the placing of accident prevention on a par with the prevention of faulty work of other kinds, and to base future accident-prevention studies on the knowledge of pertinent facts as to unsafe conditions, and unsafe practices and their causes.

SALARIES

BOOTHE, VIVA, AND CHANDLER, A. E. Trend in salaries and the cost of living of faculty members in twenty-seven state universities and colleges from 1913 to 1930. *Bulletin of Business Research*, April, 1931, vol. 6, p. 17–18.

Shows that salaries at the professional level are much less responsive to changes in general business and economic conditions, as reflected in the rise and fall of the cost of living, than are the wages paid to labor.

SCIENTIFIC MANAGEMENT

VIALE, G. (Genoa). Scientific management and the human factor. *Occupation and Health*, Brochure, 1931, no. 240, 8 p.

Gives the method thought out and developed by Taylor, describing the various principles involved, according to an original report by Professor Viale giving the Italian point of view.

TRADE UNIONS

KUMMER, FRITZ (Berlin). International Federation of Trade Unions. *Monthly Labor Review*, April, 1931, vol. 32, p. 802–808.

Membership, International Trade Secretariats; International Trade Union Congress at Stockholm.

TURNOVER

ROBINSON, P. PRESTON. Labor turnover in New York metropolitan stores. *Journal of Retailing*, October, 1930, vol. 6, p. 88–91. (Abstract in *Social Science Abstracts*, March, 1931, vol. 3, p. 409.)

Comparative study of labor turnover in eight specialty and department stores in Brooklyn, New York, and Newark.

UNEMPLOYMENT

BUTLER, H. B. (Deputy Director, International Labour Office, Geneva). International aspect of the unemployment

problem. *Annals of the American Academy of Political and Social Science*, March, 1931, vol. 154, p. 49–54.

Necessity for international cooperation in trying to work out a national solution for regularization of production and unployment stabilization. No one country can set the world price or control the world production.

GROGGINS, P. H. (Chemical Engineer). Let industrial retirement solve unemployment. *American Federationist*, April, 1931, vol. 38, p. 413–416.

Proposed to set aside from the returns to industry a definite percentage of the earning power of labor which will be accumulated as a reserve to provide for the depreciation of the worker at the age of 64 years.

LEISERSON, WILLIAM M. (Antioch College). Industrial fluctuations and unemployment. *American Labor Legislation Review*, March, 1931, vol. 21, p. 65–83.

Believes if economists would analyze income distribution as it actually takes place under modern condition of corporate industrialism, and point the way to sound methods of controlling income distribution which would stabilize wage payments in spite of fluctuating employment, conditions would be improved and at least some human suffering eliminated.

SPATES, T. G. (European Representative of Industrial Relations Counselors, Inc., New York, attached to the International Labour Office). Unemployment as an international problem. *Geneva Special Studies*, March, 1931, vol. 2, p. 1–30.

Conclusion reached that the roots of the crisis lie in uncoordinated production and uncontrolled competition intensified by the lagging of distributive efficiency and mass purchasing capacity behind productive efficiency and productive capacity.

UNEMPLOYMENT INSURANCE

DOUGLAS, PAUL H. (Ph.D., University of Chicago). Partial stabilization of workers' incomes through unemployment insurance. *Annals of the American Academy of Political and Social Science*, March, 1931, vol. 154, p. 94–103.

Suggests features of unemployment insurance system, including joint contributions by employers and employees; administration of fund by joint board representing workers and employers; public employment offices administered by same board; benefits paid to those laid off because of lack of work. Believes state should be given power to require those who are receiving benefits to attend adult schools.

GILL, A. CLOYD. Unemployment insurance —then what? *American Bankers Journal*, February, 1931, vol. 23, p. 679–680, 727.

System of unemployment insurance in England, Germany, and other countries, has moved far beyond its original purpose and tends to put nation politically under control of persons who prefer not to work. Analogy exists in fate of ancient Rome.

UNITED STATES—ECONOMIC CONDITIONS

DONHAM, WALLACE B. (Dean, Harvard Business School). Can American business meet the present emergency? *Harvard Business Review*, April, 1931, vol. 9, p. 257–269.

Author believes we must have a philosophy, a plan, and a method of thinking about the future. Discusses the present emergency and our export trade; the solution offered by developing the home market; the unemployment problem and its solution, work; the relation between business and government.

WAGES

KOON, SIDNEY G. (Associate Editor, Iron Age). Our manufacturing worker and his wage. *Iron Age*, April 16, 1931, vol. 127, p. 1247–1250.

Article gives wage data covering a 70-year period, with summary showing that wages not only tend to rise, through the decades, but they tend to rise faster than prices.

Wage rate increases and cuts since Oct. 1929. *Annalist*, April 10, 1931, vol. 37, p. 675.

Statistics compiled from monthly reports of Bureau of Labor Statistics.

Wages of male and female workers in various countries. *International Labour Review*, April, 1931, vol. 23, p. 558–566.

Relation between wages of men and women workers in same industry or establishment over series of years. Covers Denmark, France, Germany, Hungary, Great Britain and Northern Ireland, Norway, Sweden, United States, Australia.

WATER TRANSPORTATION BUSINESS

STERN, BORIS. Longshore labor conditions in the United States: Proceedings of the nineteenth annual convention of American Association of Port Authorities, Milwaukee, Wis., September 23–25, 1930. *World Ports*, January, 1931, vol. 19, p. 235–273. (Abstract in *Social Science Abstracts*, May, 1931, vol. 3, p. 708–709.)

Gives essential differences between a decasualized port, where longshoremen are registered, hiring centralized, with fewer casual workers to contend with; and the other method of picking men by unsupervised foremen from a large group of applicants. Decasualization has been successfully adopted in Seattle, Portland, and Los Angeles ports.

WORKMEN'S COMPENSATION

HOWARD, MATTHEW T. (in charge of Self-Insurance Bureau, Department of Labor, State of New York). Guaranteeing compensation to injured employees. *United States Daily*, May 7, 1931, vol. 6, p. 570.

Regulations imposed by New York upon employers who desire to pay for accidents out of funds which they have established.

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